PRODUCTION AMONG THE DUNA

Aspects of Horticultural Intensification in Central New Guinea

Charles J Nicholas Modjeska

Thesis submitted for the degree of Doctor of Philosophy in the Australian National University

June 1977

Except where otherwise acknowledged in the text, this thesis represents my own original work.

Nicholas Modjeska

This is copy 1 of seven original copies.

Abstract

The thesis opens with a description of Duna country and the Duna people. Part One places country and people within the larger contexts of central New Guinea (pre)history and ethnography. A problem appears: to understand the ethnographic present as an instance in a movement of history. A theoretical tension is suggested between materialistic and idealistic/mentalistic approaches to the problem. An ethnographic sequence from central New Guinea is investigated, and conditions of production, reproduction, and transformation relevant to the sequence are considered. The first part of the thesis offers analogies between history and ethnography mediated by the notion of the intensification of production. It is suggested that the rationale for increased production may rest upon a symbolic displacement whereby products of labour are seen by people as if equivalent to humans themselves for the purposes of social exchange.

Part Two displays the factors and forces of production in the ethnographic present of Duna country. "Ground", "homestead", and "garden" are presented as the ethnographic correlates of the traditionally recognized factors of production: land, labour, and capital. The level of the forces of production is represented as the level of surplus horticultural production, considered as production for the maintenance of pigs. The question of the rationality of Duna pig production is raised.

Part Three describes the social relations that Duna enter into for production. It is proposed that production among the Duna is a realization of an exploitative mode of relationship between men and women. An attempt is made to demonstrate this exploitation within a system of joint labour and ownership, on the basis of time and energy expenditure in production. It is concluded that women are exploited of their time although apparently not of their energy. Time can be falsely appropriated in part because consciousness of it is imperfect; a consequence of this exploitation is the reproduction of male dominance in the structure of social relations.

The thesis concludes with an outline of Duna political and religious institutions in their articulation with production. For Duna, the maintenance of peace, the conduct of war, and the observance of rituals all provide reasons for pig production, while at the same time they depend upon existing relations of production for their continued being. Within this circular rationality an opposition appears between the use-value of pigs for eating and their social exchange-value in creating and maintaining the structure of male-biased relationships. A concluding review of the Kiria Pulu cult, the rituals for which are absent within the ethnographic present, suggests that the future movement of history among the Duna lay in the direction of elaboration and regional co-ordination of male relations of dominance. These developments could lead to a consolidation of sex-based relations of exploitation and thereby to a further intensification of production, but initially it seems that social transformation is realized primarily within ritual rather than in actual political economy.

Preface/Acknowledgements

I first visited Duna country late in 1968, while I was a tutor at the University of Papua New Guinea and about to take up a research scholarship at the Australian National University in Canberra. Both institutions helped with that first trip. Lyle Steadman lent me his house at Lake Kopiago, and through him I met Irari Hipuya, who invited me to live at his place, Horailenda in the lower Tumbudu Valley.

I stayed mostly at Horaile' during 1970, and again for six months at the end of 1971. Despite sound advice and supervision by Andrew Strathern I was unable to grasp what the object of my researches was. I tried to gather facts about everything, resisted writing, floundered about, and eventually came to the end of my scholarship. I want especially to thank Doug and Sonia Groenwald, Don and Beverly Tuzin, Michael and Marg Hepple, and Annette Wiener for hospitality and friendship in New Guinea and Sarawak at that time.

Peter White made it possible to visit Duna country again, for five months at the end of 1973, as co-researcher in his ethno-archaeology project sponsored by the Australian Research Grants Committee. Annette Hamilton helped me to see the Duna then from the double perspective of a woman familiar with the ways of Australian hunter/gatherers. I began to think about Australia and New Guinea as an ethnographic continuum, and to think about the fundamentals of material production and sexuality.

Jim Fox resurrected my intention of completing this thesis. Professor Derek Freeman and Ms Waters in the registrar's office at the ANU have shepherded me through the necessary extensions. My fellow workers at Macquarie University have provided intellectual stimulation and helped to make time available for completion of the thesis during a difficult period of generally intensifying work loads.

Now that the thesis is finished, the number of people who have made it possible to arrive at this point seems very large indeed. I want to thank each of them, though I cannot mention them all here. I'd like to thank my parents for getting it all started, Dave French, Gail Kelly and Francis Huxley for being my first teachers in anthropology, David Pocock and Gehan Wijeyewardene for showing me that no fieldwork situation is ever completely lost, and Ralph Bulmer, Derek Freeman, Peter Lawrence and Chandra Jayawardena for being encouraging and patient professors. The relevant departments of the former territory and now nation of Papua New Guinea provided official permission for the research, and Tresury at Mt Hagen and the people at Kagamuga helped to get me there. So many people at Lake Kopiago helped, and the people of Horaile', especially at Yuku and Kuiandago. Without their cooperation, and without Irari's interpretation and the knowledge of Yopa, Paliawi, Dalipa, Danga, Kuria and other anoa kono throughout Duna country my researches would not have been possible. Of my Duna friends I also want to thank Henry Laiapi Mondoya and 'Auu. I hope no one will resent the criticism I have subjected their former lives to, nor judge too harshly my misunderstandings and errors. Of the academic institutions mentioned, the Australian National University has borne the greatest part of the costs, for which I express my grateful thanks.

Hanscophoto in Boroko kept track of my films while I was in the field. Lynne Gardiner has done the typing and some of the production midwifery. June Crawford has clarified statistical matters and kindly arranged for the computer runs. Annette Hamilton has proofed draft and final copies, as well as discussing with me much of the material. Julie Hollingdale and Phil Palmisano have performed vital services in the guidance of my psyche. Daniel and Emma Hamilton deserve recognition in respect of The Case of the Missing Step-Father; and Drusilla Modjeska, Irari Hipuya, and Annette Hamilton have provided countless hours of surplus domestic labour while remaining true friends to the end. I'd like to dedicate this thesis to my daughter, Obelia.

North Ryde, June, 1977

4

N.M.

Contents

-1

/1/ Duna Country and the Duna People

(location; landscape; climate; vegetation; humanized environment; parishes and their origins; residential mobility; neighbouring peoples and languages; material culture; physical anthropology)

Part One:

INTENSIFICATION OF HORTICULTURAL PRODUCTION IN CENTRAL NEW GUINEA

/2/ History, Transformation and Production

(prehistory; problem of social transformation; materialistic theory: production, inequality and change; the ethnographic present, past and future; idealistic theory: "hot" and "cold" societies)

/3/ An Ethnographic Sequence in Central New Guinea

(the material and the immaterial in Duna ethno-history; ethnic differentiation as history; materialistic critique; the ethnographic sequence: the Heve, the Saiyolof, the Baktaman, the Hewa, the Oksapmin, the Duna, the Huli, the Raiapu Enga; intensification of horticultural production as history; the sweet potato and transformation)

/4/ An Ipomoean Revolution?

(Watson's concept; the Canberra seminar critique; revolutionary materials of production and revolutionary change; revolutionary change and demography; models for population growth; paleolithic population regulation and neolithic growth mechanisms; sweet potato cultivation and realization of growth potential; cultural factors in present low growth-rate among Duna; pig production, demography and social exchange; role of labour in the trajectory of horticultural intensification)

/5/ Men of Taro

(Wahgi Valley prehistory; gradualism in archaeological explanation; labour and the efficiency of taro production; prehistoric drainage system in Duna country; prehistoric production for social exchange: subsistence surplus vs symbolic artifacts) p.28

p.17

p.1

p.50

FACTORS OF PRODUCTION/FORCES OF PRODUCTION

/6/ Dindi "Ground")

(relationship between man and land; Duna geography and cosmos; parish, myth and auwi; ownership and alienation of territory; agnates and land-rights; trees; Duna and Huli land tenure compared)

/7/ Anda ("Homestead")

(Duna houses; sexual segregation; daily activity cycle; cycle of residence; pigs and homestead location; residential patterns in the upper valleys and Huli country; spatial organization of production and reproduction—the homestead as locus of labour; construction and ownership of homesteads by men; homestead as capital; Duna tool-kit and ownership of tools)

/8/ Mbou ("Garden") .

(garden interviews; forest and fallow (yango); fencing and site preparation; planting: mondo and tse; case example: the gardens at Yuku; garden boundaries: dispute and co-operation; women as garden workers in partnership with men; garden areas; crops; areas under cultivation; garden productivity: sweet potato yields; comparisons with other Highlands systems; production levels in Highlands horticultural systems compared; labour, environment and production)

/9/ Pigs and Sweet Potato Consumption

(Duna pig census; "standard pig units", pigs—"composite statistic"; sweet potato consumption by pigs; sweet potato and total vegetable-consumption by humans; average daily consumption checked against production—Highlands systems compared; surplus horticultural production; production and consumption—Duna homesteads compared)

/10/ Labour and the Intensification of Production

(labour time necessary in sweet potato production— site preparation, mounding and harvesting; labour intensity per land unit—Highlands comparisons; intensity and period of cultivation; average labour intensity per garden cycle—Highlands comparisons; labour intensity per capita: productive-efficiency method and area-under-cultivation method; productive efficiency and the intensity of production)

/11/ Knowledge and Production

(gao, "spells"; mana, "custom"; kono, "thoughtfulness"; the morality of pig production and the a-morality of cannibalism; rationality and irrationality in production) p.95

viii.

p.106

p.112

p.138

p.147

Part Three:

RELATIONS OF PRODUCTION

/12/ Theoretical Introduction

(theories of primitive modes of production; Sahlins' domestic mode of production; Chayanov's Rule; absence of a mode of surplus appropriation within the DMP; Terray's Guro analysis—a lineage-based mode of production; "primitive communism": are the Guro elders exploiters?; Hindess and Hirst's critique; putative "primitive capitalism" in New Guinea; New Guinean "capitalism" compared with marxian concepts of capitalism; intuitive formulation of mode of production appropriate to the Duna example)

/13/ Production, Distribution and Consumption among the Duna: .Units and Relationships

(kinship and homology of production and consumption; hierarchy of Duna production and consumption units; "sharing" and "helping" as principles in Duna social relations; possibility of individual self-subsistence; homestead groups and relationships; hostility between brothers; nendeke ("friends"); mother-son relationship; batchelors and spinsters; brothers and sisters; relationship of marriage; what rights are secured. through payment of bride-price?; denial of the sexual basis of marriage and the paradox of domestic labour; husband and wife as joint owners of homestead production; co-ordination of homestead production by the lineage; crises of over-production; dominence of sex groups in consumption; cross-dominance of homestead and lineage in determination of production and distributioncomparative considerations)

/14/ Can Exploitation be Demonstrated?

(exploitation of wives and generalised explotation of women; coercive force and exploitation of women; sexual division of labour by time; comparative examples; sexual division of labour-time and the preservation of inefficient horticultural practices; Kapauku production restricted by social relations rather than by technology; Maring production restricted by technology?; Kapauku example considered further: exploitation intensification vs. involutional fetishization; exploitation of women reconsidered—appropriation of time vs. appropriation of energy; estimate of caloric expenditure in Duna gardening; caloric expenditure for total subsistence activities; equality of sexual division of labourenergy; exploitation of women's labour-energy contrary to Duna principles) p.170

p.194

/15/ Time, Energy, and Consciousness

(Duna consciousness of time and notions of labour intensity; the calculus of explotation and the consciousness of the producer; use-value of surplus labour-time; surplus-time and the reproduction of relations of dominance within the social formation; male-bias in the network of social relations; severance of links between women by virilocal marriage supported by women's labour; primary exploitation within production and secondary exploitation in distribution intuitive formulation of mode of production in relation to the totality of the social formation)

Part Four:

PRODUCTION AND THE SOCIAL FORMATION

/16/ The Lineage, Coercive Force, and Compensation

(circulation of the production and the rationality of production; functional interdependence of superstructure and base; the lineage as analogue of the State; authority and coercive force within the lineage; sexual antagonism; pig production and the exercise of force against the producers; warfare—coercive force outside the lineage; case histories; the articulation of warfare to production by the practice of compensation; rationality of Duna warfare; conflict and level of appropriation of economic surplus)

/17/ Sacrifice, Ideology and Transformation

(social exchange and sacrificial consumption as alternate modes of circulation; substitutability of pigs for people as the rationality of exchange; sacrifices to dama; funerary distributions; kaka payments; auwi rituals and the pig cycle; the dilemma of exchange vs. consumption; story of the man with no anus; fantasy of auto-cannibalism; auwi and the rationality of sacrificial consumption; Kiria Pulu and the transformation of social relations)

Appendix One: Age structure and population dynamics in Highlands societies

Appendix Two: Empirical/empiricist investigations into homestead composition and production

Notes

Literature Cited

p.248

p.276

p.297

p.305

p.327

Maps, Figures and Tables in the text

4

2

		page	
1:1	Map, Central New Guinea	2	
1:2	Figure, Rainfall at Lake Kopiago Station	3	
1:3	Map, Tumbudu Valley, western Duna country	6	
1:4a	Table, Changes of residence between parishes	10	
1:4b	Table, Reasons given for changes of residence	11	^
3:1	Figure, Relationships of ethnological resemblance	34	
3:2	Table, Population and production characteristics	37	
3:3	Figure, Production systems paired by pig:person ratios	46	
		*	
4:1	Table, Completed sibling sets, Horailenda	53	~
4:2	Figure, Hypothetical models of population growth	54	
4:3	Table, Mean live births and children surviving	60	
4:4	Table, Admissions for malaria, Tumbudu Valley 1971	63	1
4:5	Table, Mean family sizes, Tumbudu Valley	63	
4:6	Table, Tumbudu Valley parishes and population densities	64	- 4
4:7	Table, Currently married women, Tumbudu parishes	67	~
4:8	Figure, Brookfield's view of intensification	72	~ e
4			
5:1	Table, Chronology of Australasian prehistory	78	
	New can a	*	
8:1	Table, Garden interviews with Horailenda men	114	
8:2	Map, Gardens at Yuku, Horailenda	119	
8:3	Figure, Genealogical connections of Yuku gardeners	120	
8:4	Table, Garden partners at Yuku	121	
8:5	Table, Garden plots within Yuku "big fence"	122-]	24
8:6	Table, Horailenda homestead sample	129	
8:7	Table, Observations and estimates of sweet potato yield	132	
8:8	Table, Sweet potato production per person/day	136	-
9:1	Table, Pigs at Horailenda homesteads	138	
9:2	Table, Per capita consumption of sweet potato	142	
9:3	Table, Sweet potato production and consumption/person/day	143	
9:4	Figure, Areas under cultivation and pigs tended	145	
9:5	Figure, Areas under cultivation and consumption needs	145	
			-
		¢ .	

xi.

	10:1	Table, Estimated time required per .5 ha forest garden	148 .
	10.2	Table, Estimated hours/worker/day at peak of pig cycle	158
	11:1	Table, the palena plant	162
			1. 1. 1.
	12:1	Figure, Sahlins' analysis of labour-intensity and	
		domestic consumption	174
	13:1	Table, Homestead composition at Horailenda	197
	14:1	Table. Sexual division of labour-time in Highlands systems	219
	14:2	Table. Productive efficiency in Highlands systems	223
	14:3	Table. Estimated caloric expenditure in Duna gardening	223
1	-14:4	Table. Subsistence, mean time per worker per week	234
	14:5	Table. Estimate of total caloric expenditure per	
	1	person per week	236
	العير		
1	16:1	(a & b) Table, Some characteristics of Duna wars	262-263
	16:1	(c & d) Table, The ostensible causes of Duna wars	264-265
	16;2	Figure, Distribution of sorcery and witchcraft accusations	273 —
	16:3	Table, Deaths by violence as percentage of all adult deaths	273
ž	Append	lix One:	
	Figure	e 1: Age/sex structure, Horailenda 1967, administration	11 () ()
	-	census	299
	Figure	2: Age/sex structure, Horailenda 1970, anthropological	-
		census	299
	Figure	3: Age/sex structure, Kelabo 1971, administration census	300
	Figure	4: Superimposed age/sex profiles, Kelabo, Horaile & Kakoli	300
	Figure	5: Age/sex structure, southern Hewa, 1968	303
	Figure	6: Age/sex structure, crude data and reconstructed	
	4	profile, central Tari Basin (Huli) 1959	303 -

0

xii.

xiii.

19 . · · ·

Si an

1

·**

v

	Append	ix T	wo:			
	Figure	1:	Empi	rical and Chayanov slopes of Duna pig production	309	
	Figure	2;-	a)	Worker units and areas under cultivation per		
		home	stead	•	310	
		4 5	b)	Worker units and pigs per homestead	310	
	Figure	3:	a)	Consumer units and areas under cultivation per		
		h	omest	ead	311	
			b)	Consumer units and pigs per homestead	311	
•	Figure	4:	a) 1	Male worker units and pigs per homestead	317	
	•		b)	Female worker units and pigs per homestead	317	• •
	Figure	5:	Male	worker units and female worker units per homestead	319	

14

1. 1

. .

1 2

27

Photographs (out of text)

5.

6.

7.

1. The Tumbudu Valley, as seen from Kakoma noma in Puiyanda parish, near the river's source on the edge of Huli country. The Koroba - Lake Kopiago road is visible in the foregound, left. Horailenda parish territory lies on the slopes of the Mullers, immediately to the left of the prominent peak in mid-valley just below the cloud Peaks obscured by clouds in the far distance are line. in Ok country. [colour photo, thesis copies 1-5 only] frontispiece 2. A Duna forest garden at Horailenda. Mondo (sweet potato mounds) on the right, tse (individual plantings) in crevices in the limestone outcropping on the left. The bananas are planted at the bottom of the garden sink-hole. [colour photo, thesis copies 1-5 only] frontispiece Aerial photography: a) Aluninda, Haiwi' and Nauanda 3. parish territories, adjacent to the lower Tumbudu Valley; b) Horailenda (flying height 14,500 feet asl); the Tumbudu River is upper left and the uncompleted Hagini'-Aluni' vehicular track is visible upper right; Yuku garden area is lower left; 'c) Harege' - Kipari' area with karst sink-holes revealed by forest clearance; Kelabo (mission) air-strip is lower right; d) central Tari Basin, showing fixed field system and extensive clearance of forest; Tunda parish-see Glasse 1968is upper right. following p. 4. a) Paliawi of Horailenda, my chief informant on matters of

a) Pallawl of Horallenda, my chief informant on matters of religion, cosmology and abstract speculation; b) Yopa of Horaile', my chief genealogist and authority on parish membership, marriages, financial affairs and warfare following p. 13

a) Hewa men, photographed at the sawmill, Lake Kopiago station; b) Oksapmin men dressed for dancing (at Oksapmin air-strip) following p. 40

a) A typical homestead at upper Horailenda; upper house with earth-oven pit in foreground is occupied by the male homestead head alone; the left end of the lower house is occupied by an adolescent son, and the right half by the wife/mother and her pigs; b) typical Duna fence construction with logs and props in a new garden site; vehicular road in lower right foreground following p.106

a-d) Distribution of a bride-price at Aluninda. The distribution is being conducted by the bride's father; the bride is visible extreme left of photo b. Note the substitution of \$2 notes for *kulini* pigs following p.203

xiv.

a-d) Butchering of pig ("half-sides") at a baptism celebration and distribution of *pokao* (pork-strips) to men (upper right) and women (lower right) at a mortuary distribution following p.278

xv.

a) Dancing the *mali* in celebration of Christmas, Harege' 1973; b) Irari Hipuya of Horaile': my host and companion, translator, guide, camp-organizer, interpreter of the people and philosopher of the practical (photographed at the Commonwealth Mint, Canberra 1974) following p.296

1

9.

8.

Abbreviations and conventions

4	haberarian new Sarney haministrative onic
asl	above sea level
BP	years before present
D	Duna
DMP	domestic mode of production
n.d.	no date
p.c.	personal communication
PNG	Papua New Guinea
qu	quasi
TPNG	the former Territory of Papua and New Guinea

standard abbreviations for metric units are used

Parish names are freely contracted, both in local and administration usage:

Yeru' = Yerunda Aluni' = Aluninda Haiuwi' = Haiuwinda Naua' = Nauanda

8 - Y1

A. To

Aleks Southers of

[]: []

٢.

Horaile' = Horailenda Hagini' = Haginda Huguni' = Hugunda et cetera

Kin-type notation: M= mother('s), F=father('s), S=son('s), D=daughter('s), B=brother('s), Z-sister('s), H=husband('s), W=wife('s).

Classificatory relationships are indicated by double quotation marks: e.g. "father" or "F" = classificatory father.

/1/ Duna Country and the Duna People

"Ground is like a tree; our fathers told us this. They said the roots of our ground were in Kui (Huli) country and the top-twigs were beyond the Strickland. Men come up from the base. Like the trunk of a tree, there are many men at the base. Many men, big men. In the middle, small men — not many, not big. The middle (is) here, our ground. On the top, in Kora (Oksapmin) country, the men are smaller still and fewer yet. Beyond that finish, there are no more. As it is with trees, so it is with men."

- Paliawi of Horailenda

Some 13,000 speakers of the Duna language live in three main mountainous river valleys enfolded within New Guinea's central cordillera in the region immediately east of the Strickland River (map 1:1).¹ The inhabitants of this region speak of it as "Yunua dindi", "Duna country".² In all, it comprises some 2,250 square kilometers, extending from the crest of the Müller Range to the low divide between Lake Kopiago and the Lagaip River, and from the Strickland River to the headwaters of the Tumbudu and Logaiyu.

Except for river flats and the swampy country around Lake Kopiago, the topography varies from hilly to precipitous. The landscape has been formed on uplifted folds of Miocene limestone under the influence of a wet tropical climate.³ Escarpments, karsts and sinkholes are prominent features. Streams cut deeply into gullies dissecting main slopes, disappear into subterranean watercourses, in places reappearing again and plunging over spectacular waterfalls. Land slips and rock slides contribute to the dynamic of the landscape and the rivers run brown with soil and silt. Humic brown forest soils and orange to reddish clay soils are common throughout most of the region, with dark peaty soils in the lake basin and some gleyed white clay soils in the upper valleys.

The climate is wet, with an average annual rainfall of 3610 mm (142 inches) distributed throughout the year in a double maximum



pattern (figure 1:2) typical of the southern flanks of the central cordillera (cf. Brookfield and Hart, 1966).⁴ During the period 1963-1970, rain fell on an average of 287 days in each year. There is no "dry season" and, indeed, at this latitude little sense of the passing of seasons at all. Correspondingly, there is little seasonal variation in the social activities of the people and no annual horticultural cycle. The simultaneous preparation and harvesting of gardens goes on throughout the year.

/1/



Figure 1:2 Monthly means of rainfall at Lake Kopiago station, 1963-70.

3.

The climate is an agreeable one despite the rain. Morning mists usually clear by 10 a.m. and most days are fine. Clouds form over the peaks in the early afternoon and descend to ground level around 5 p.m. Light rain then sets in and continues until near midnight. People in Duna country live at slightly lower elevations on average than people elsewhere in the more populous regions of New Guinea's Highlands, and temperatures are correspondingly warmer. At 1700 m I recorded daytime maximum temperatures ranging from 22° to 29° and night minimum temperatures from 13° to 19° over a period of a year. The mean maximum throughout the year was 25.5° and the mean minimum 18.2°.

The natural vegetation of most of Duna country was originally rain forest, but as elsewhere in the Highlands much of this has now been modified by man. Along both sides of the Strickland River vast expanses of grassland are maintained by burning, with fires set by men as an aid to hunting whenever the weather is dry. Only a few patches of lowland rain forest remain along the edges of these grasslands. The lowest-lying Duna communities (at approximately 950 m elevation) along the edge of the Strickland gorge are able to obtain useful varieties of bamboo from these remnant forests, as well as *Artocarpus*, *Pangium edule* and sago, all of which are unknown at higher elevations.

Above 1000 m the original mixed oak forest has everywhere been interfered with to some extent by human activity. By comparison with more populous regions of the Highlands, however, the extent of clearing is not yet great (see photographs 3 a-d). At Aluninda, just above the Strickland grasslands, less than a third of the original lower montane forest has been cleared. By contrast, at Kiparianda (now known as Kelabo) in the upper Tumbudu Valley, the original forest remains only in ravines and covering rough karst country near the river. The remainder of Kipari resembles a somewhat rugged parkland of gardens, homestead sites and fallow-lands of sword grass *Miscanthus*) studded with pandanus, casuarina and hoop pines. Above the limits of cultivation (corresponding roughly with the afternoon cloud-line at about 2000 m) the original forest rises to the mountain crests,

/1/



11/

finally giving way to stunted moss-covered alpine forests and grassland forest pockets among the peaks. Throughout the upper forests of the Müller Range, nut-bearing pandanus trees provide an important wild food resource.⁵

5.

Duna country is thus in part a product of accumulated human labour acting upon a natural environment. The environment has been humanized. An illustration will convey something more of its human dimensions (see map, 1:3 and photograph 1). Yeru', located at the point where the main slope of the Müllers descends to the Strickland, is the most westerly place in Duna country. From Yeru" it is a day's walk through forest punctuated with a few overgrown clearings to Aluninda. From Aluni' another day's walk through increasingly cultivated areas brings one to Hugunda, mid-way up the Tumbudu Valley. On the third day one passes through Kiparianda and enters the somewhat depleted environment of the upper valley. The soil is rocky and sword grass and small regrowth trees predominate. Late afternoon brings one to a second place called Hugunda, at the headwaters of the Tumbudu where it springs out of the Müllers below Lavani Valley. This Hugunda is said to be the ancestral territory of the people at the first." It lies on the eastern edge of Duna country and many of its inhabitants speak Huli as well. Beyond this Hugunda, Huli country proper starts. In three days one has thus traversed the length of Duna country. In doing so, one passes along the flanks of the Müllers through the territories of nineteen local groups with a combined population of roughly 3,600 people. Another eleven or so territories with a further population of perhaps 1,800 people lie on the eastern bank of the Tumbudu River. Population density is low by Highlands standards - under 12 square kilometer (30/square mile) within the zone of habitation in the lower Tumbudu Walley. Local group territories are referred to as "villages" in administration records, but since the people live in homesteads dispersed throughout each territory I shall refer to them here as "parishes".7 Duna call them dindi pukua, "big grounds" or imatsana dindi, "woman-taking places", the latter etymology suggesting the role which local grouping plays in the observance of exogamous rules of marriage. In all there are



some 60 such parish territories in Duna country. They constitute an arrangement of social divisions of the landscape, a modification by human activity less visible than the changes to the forest environment but no less significant in consequence for social order.

7.

/1/

Each parish has an esoteric history of its origin which is transmitted as an oral tradition among men descended from the parish founder or founders. These tales, called hapiapo tse ("origin beforestory"), relate how the earliest ancestors established themselves in the country at a time when the only prior occupants were cannibal giants (auwape) and supra-human beings (dama). Some of the founders are said to have originated from the regions west of the Strickland or south of the Müllers, while others originated from Huli country or from Ipili-Paiela to the east. The former are portrayed in the origin stories as magical, capable of travelling underground, changing form, influencing the fertility of the soil; the latter are mundane immigrants without magical powers. The stories relate how magical and mundane founders meet, how marriages or pacts of fictive kinship ensue, how parish boundaries are demarcated and cults and sacred sites established. Each account concludes with a genealogical recitation of from seven to fifteen generations, linking magical and mundane founders to present-day men. Although descent is traced through either males or females, genalogies are often related as if a single line of agnatic descent linked together all men of the parish up to the last few generations. Men acknowledge, however, that these patrilineal genealogies are sometimes fictive. "We call our nephews 'sons' for nothing", they say.

Parish descent groups have one or sometimes two levels of segmentation. The sons, grandsons or great-grandsons of parish founders are reckoned as founders of cognatic lineages called *domene* (qu. "being-kind" and meaning according to contexts "related kind", "family", "species", "kindred", "cognatic lineage" or ambilineage).⁸ Since descent is reckoned cognatically, it is not possible for all the members of the *domene*, not even all the male members, to reside together as a local group. The members of a *domene* resident within a parish, together with those non-resident members who maintain an interest in the group, constituted in former times an action group concerned with the waging of war and the maintenance of peace, both in their military and economic aspects. Parish descent groups comprise from two to fifteen local *damene* groups. In the more densely populated parts of Duna country these groups may claim discrete territories within the parish territory, while in most areas the members of a *damene* will reside scattered throughout the parish territory with their gardens and homesteads interdigitated with those of men of other *damene*. Warfare between the *damene* of a parish was not uncommon, but a unified front would be presented to external attack from another parish.

The resident members of a *domene* (almost always localized within one particular parish) sometimes classify the members of their group according to a scheme emphasizing residence and involvement in group activities:

anoa hola ko "men who stand here"

anoa hola hangu ko "men who stand here only"

anoa ngoya heya yako _____ "men who come and go"

anoa hila ko "men who stand outside" anoa ngoya heya yako "men who come and go"

anoa hila ngala ko "men who stand outside and have gone"

anoa ngaiya ngo "men who have gone completely"

"Here"-men are men who reside within the parish and "outside"-men are those who reside elsewhere. "Outside"-men may be further distinguished as "men who come and go" and "men who have gone". Those who "come and go" are those who visit within the parish, sometimes every week, sometimes only once in six months or a year. They demonstrate their

8.

interest in the affairs of the group by contributing live pigs or pork "half-sides" for prestations, distributions and rituals sponsored by the damene, or by fighting on the side of the group whenever conflicting loyalties to the opposition are not too great. "Here"men can also be distinguished as men who are "here only" and men who reside within the parish while also taking an active interest in the affairs of one or more other groups. At the time of my fieldwork, a contribution of a pig every two to four years seemed sufficient to indicate a man's continuing interest in a group, although traditional rituals had been abandoned and payments related to warfare largely The contribution rate may have been higher in the past. Men settled. who were known to have made a few contributions in the past, but who had not visited in several years, were reckoned as "men who have gone", while men who had never contributed or who were known to be unlikely to ever visit again were "gone completely". These men were considered to be damene members only in respect of their descent connexion. Although they might become contributing or even resident members of the group at some future time, for the present it was said "we don't hear about. them; they're completely lost". When such men die the active members of the *damene* do not even bother to attend their funerary ceremonies.

9.

Men tend to live within the same parish as their fathers, but most men will reside with their mother's kin at some time during their lives, and not a few men will reside elsewhere as well. At the parish of Horailenda (lower-middle Tumbudu Valley) I found that 70% of the men had been preceded in residence by their fathers, although only 25% claimed descent through males only from the parish founders. Around 50% of Horaile' men traced a descent affiliation (either agnatic or cognatic) to the founders through their fathers only, and 25% traced an affiliation through their mothers only. About 15% were able to trace descent affiliations through both parents, either to unrelated co-founders of the parish or as a consequence of non-exogamous marriages within the parish. The remaining 10% of Horailenda resident men had only qualified rights within the parish, based on affinal, kindred or friendship relations with fully qualified descendants of the parish founders. While a majority of men will be found living in their father's parish at any given time, residential affiliations need to be seen in a diachronic perspective as well. Everyone recognizes descent affiliations to a number of *damene* in different parishes (e.g. their father's, their father's mother's, mother's father's, mother's mother's etc.) and it is usual for men to move from one parish to another living with different groups of their kin at different times in their lives.

/1.

Table 1:4a	Changes of 86 Horaile	residenc nda men	e betwe	een p	arishes	as r	eporte	d by
· · · · ·		Number	of chan	iges	of resid	dence		*
	0 1	2	3	4	5	6	?	8
Number of men reporting	25 14	14	⁽⁴ 15	9	3	4	1	, 1 , '

Glasse (1968) has reported that Huli men often maintain homesteads in different parishes simultaneously. The need for a refuge in time of war and the desirability of having claims to garden land in more than one parish are contributing factors to this practice of multilocal residence. In the Tumbudu, however, only a few men in the more densely populated upper valley have more than a single homestead at a time. These men give as the reason for multi-local residence the need to maintain active claims on garden lands formerly used by their "fathers" and by their mother's kin. Warfare was not a factor influencing residential decisions in Duna country during the past generation (Table 1:4b), although several men recalled that their parents and grandparents had changed residences after defeats.

Reasons	Number of cases	%	
Moved with father or mother as a child	57	32%	
Thinking of kin elsewhere or called for by kin elsewhere	30	17%	
Death or dispersal of kin at old homestead	16	98	
Disputes and/or dissatisfaction with neighbours and neighbouring kin	15	8%	
Thinking of a former place of residence again	11 /	6%	7
Thinking of "true" agnatic parish	10	6%	
Crop shortage and/or dissatisfaction with garde	ns 10	68	¥.
"Yao" (no reason)	7	48	
Sickness at old homestead	6	3%	- 1
Wife wanted to move	6	38	
Concerned about neglected pandanus holdings elsewhere	3	2%	
Other reasons	6	.3%	
	177	99%	

4b Reasons given by Horailenda men for changing parish of residence.

11.

Table 1:4b

Residential mobility extends beyond the limits of Duna country and into the territories of neighbouring ethnic/linguistic groups. At Yeru', for example, many people are able to trace descent affiliations to Bogaia and Kora (Oksapmin) ancestors, and both individuals and families make residential shifts between the two regions. The same applies for those Duna living on the fringe of Hewa country, for the Duna in the headwaters of the Logaiyu who intermarry with the Ipili-Paiela, and for the Duna living along the transitional boundary with Huli country. Many of these people are bi-lingual and some are tri-lingual. Yeru' people are said to "hear" Duna, Bogaia, Kora (Oksapmin or Bimin or both?), and Hewa.

The extent to which the several languages in the region share common items of vocabulary gives some indication of the amount of past contact between these peoples, though a much more detailed study would be necessary to disentangle genetic relationships from borrowings. I estimate shared cognate percentages between Duna and neighbouring languages as 31% for Huli of Koroba, 28% for Bogaia, 27% for Ipili-Paiela, 2% for Hewa and less than 1% each for Bimin and the Oksapmin language.

. /1/

The Duna language has been classified by Wurm (1964) as the sole member of the aberrant Western Family of the East New Guinea Highlands Stock. Voorhoeve, on the other hand, apparently finds a cognation percentage between Duna and the mountain Ok languages sufficient to include Duna in the Central and South New Guinea Stock (McElhanon and Voorhoeve 1970).¹⁰ Wurm (1970) more recently terms Duna a "family-level isolate" and places it along a transitional boundary between the phyla of the two stocks. The linguistic picture therefore appears equivocal. A plausible model explaining this situation is of course provided by those Duna oral traditions suggesting a mixing of both western and easternsouth-eastern populations in the settlement of Duna country.

Material culture (house styles, men's wigs, women's long grass skirts, and many lesser elements), horticultural practices, patterns of _____ kinship and social organization, the conduct of warfare and the content of oral traditions and cult rituals all show clear affinities between the Duna and their Huli neighbours, with much weaker connections in all other directions.¹¹ Since there is an uninterrupted distribution of population between the fringes of Huli country and the upper valleys of Duna country, it might be supposed that Duna culture represents little more than a "fringe" variant of Huli. This supposition, however, would not explain the distinctively different status of the Duna language. My own supposition is that Duna language and culture have developed under the influences of a population spill-over from Huli country, dating from at least the adoption of sweet potato cultivation in the Tagari (Tari) Basin, and acting upon an already present substratum of western (and possibly eastern) population elements. Given the usual differential marriage rates between central and peripheral populations, I would suppose that Tagari men married Strickland women more than Strickland men married up-valley women. This could have resulted in a

12.

population with a Tagari-derived culture speaking a language based on Strickland patterns and forms — assuming that children learn their earliest linguistic habits from their mothers.

13.

Physically, the Duna most resemble their Huli neighbours with whom they most frequently intermarry. Together with the Huli, they are representative of the "light skinned men" whose appearance surprised Hides on his first patrol into the Strickland-Rentoul headwaters (Hides 1936). Average height for adult men is 153.4 cm (60.4 inches) and for women 145.5 cm (57.3 inches). Average weights are 51.5 kg (113.9 pounds) for men and 45.1 kg (99.7 pounds) for women (Walsh et al. 1966). On average the Duna are a slightly smaller people than their Huli and Ipili-Paiela (fringe Enga) neighbours, while they are somewhat larger than the Strickland peoples and the Hewa. Impressionistically, Duna physical appearance is in other respects similarly intermediate between the Huli to their southeast and the Oksapmin and other Strickland peoples to their northwest. Huli tend to be large, light-skinned and dolichocephalic, with long narrow faces, and high-bridged, almost aquiline, noses with depressed tips. By contrast, the Strickland peoples are small, more frequently dark-skinned and less markedly dolichocephalic. They have shorter, broader faces with prominent brow-ridges, and depressed nasal roots and slightly shorter and broader noses.¹² Most Duna resemble Huli, but as one approaches the Strickland, expectably, one encounters these latter features increasingly. All of these peoples - Strickland, Duna and Huli - are of a more or less robust and stocky physique. In this they all differ from the Hewa to the north, who have a distinctive gracile morphology, appear almost brachycephalic, and have narrower lips and somewhat finer features than the peoples to their south.

Gene frequencies derived from blood group sampling have been used by Booth and Taylor (n.d.) to calculate minimum length genetic networks relating Highlands populations. Their method groups together Lake Kopiago Duna with Oksapmin and Telefolmin populations and splits them off from more easterly populations including Enga, Jimi, Chimbu and Siane. Booth and Taylor argue that their method shows relationships between

11/



/1/

genetic populations which correspond to relationships derivable from linguistic and ethnological materials. On the other hand, MacLennan <u>et al</u>. (1967) examined the same blood group data and concluded that so far as Lake Kopiago, Telefolmin and Oksapmin were concerned, "no ethnological hypothesis can be offered. It is more likely that random genetic drift or selective advantages ... is responsible for the significant differences in gene frequencies" (p. 61). Unfortunately, neither study included blood group frequency data from Hewa or Huli populations.

Sinclair (1966, 1973) has commented on the "semitic" features and "Biblical" appearance of many Duna men, and older men he often refers to as "patriarchs". Although the Duna superficially resemble caucasoids as much as or more than any other group of Melanesians, European perceptions may be influenced by cultural as well as by physical features. Full beards with plucked moustaches are the norm for men, while their wigs variously resemble turbans, matadors' hats and pharonic headgear. By comparison with their neighbours, the Duna perhaps seemed "patriarchal" because old men in their society actually had more power and influence. Knowledge and diplomacy were more valued than aggressive self-assertion or coercive force in the conduct of affairs, though the latter were not unimportant. Formerly, ritual was an important factor in group life, more so than among either the Huli or Hewa, and old men were the chief ritual experts. Older men were also largely able to control the flow of material wealth, in the form of pigs, within the society, and this had the effect of preventing young men from marrying 🛶 and attaining independence from their elders. Duna society thus tended to be gerontocratic if not actually patriarchal.

The Duna people, their physical make-up, their language and other aspects of their culture, their forms of sociality and territorial organisations, and even their natural environment — taken together with the material modifications of the environment brought into existence by present and past generations of men — all of this presents a complex picture of variations, of similarities and differences within a comparative perspective. By comparison it appears that the Duna resemble in some

14.

respects any one of the neighbouring peoples who surround them, while in other respects they are unlike this group and similar to one or more of the others. Comparisons could be extended further, to the neighbours of neighbours or beyond. Comparisons can also be made within Duna country, between one region and another. I have noted variations in the environment and its human modification, as well as some social and physical differences, between the lower Tumbudu Valley and its headwaters on the edge of Huli country. Regional variations in dialects and in cultural patterns (e.g. in the decorative carving of arrows, in the functional designs of bamboo jew's-harps, or in the form and content of songs or rituals) could be detailed as well.

11

Similarity and difference attracts the attention of most researchers in the human sciences who have direct experience in New Guinea. Wherever one goes, one encounters again the same things which have been known before, and yet on each occasion things that seemed familiar appear somewhat different. Familiar elements recombine, take on different emphasis; somehow the configuration as a whole is transformed. For any anthropologist who accepts comparative study as a basic tool for the understanding of human societies and sociality, the complex patterning of similarity and difference within New Guinea poses a magnificent variety of problems — and offers as well a variety of strategies for the development of possible solutions. In the first part of this thesis I outline the dimensions of one particular problem and consider some formulations of strategy towards this problem's solution.

15

Part One:

INTENSIFICATION OF HORTICULTURAL PRODUCTION IN CENTRAL NEW GUINEA

Agriculture is in fact the first example of servile labour in the history of man. According to biblical tradition, the first criminal, Cain, is a farmer.

- Paul Lafargue, The Right to be Lazy

The great challenge lies in the intensification of labour: getting people to work more, or more people to work.

Marshall Sahlins, Stone Age Economics

/2/ History, Transformation and Production

Duna country and Duna society exists not only as a place located in space, but also as a place located in time. Although archaeological explorations have yet to be conducted in Duna country, its prehistory may still be glimpsed in the larger contexts of what is known of the prehistory of New Guinea and its surrounding regions. Man's history in New Guinea goes back thousands of years. Reliable radiocarbon dates for human occupation in Australia now go back to 37 - 38,000 BP (White, p.c.). A similar antiquity for man in New Guinea seems not unlikely, since New Guinea and Australia were joined by a land bridge until sometime between 8000 and 6500 BP (Mulvaney 1975). Traces of occupation from a rock shelter at Kösipe in the Papuan Highlands have been dated at 26 - 27,000 BP (White 1972) and earlier dates will no doubt be forthcoming. Closer to the present, pig bones (suggestive of horticultural economy) have been found in the Highlands and dated at 5000 BP (S. Bulmer 1966). At about this time the pollen record suggests the clearing of forests (Flenley 1967; Wheeler 1970) and ground-stone axes become common in the archaeological record (White 1967). Yet cultivation of the sweet potato, which is today the mainstay of Highlands economies, is unlikely to have been introduced earlier than 350 BP. The sweet potato (Ipomoea batatas) has been shown to be of South American origin and most probably reached New Guinea after Spanish colonization of the Philippines (Nishiyama 1963; Yen 1963; Conklin 1963).

Further findings are continually adding details to the reconstruction of New Guinea's prehistory, but it seems likely that the main features of the technological and economic sequence suggested by the Bulmers in 1964 will remain secure:

<u>Phase I</u>: first occupation of the Highlands by paleolithic hunter/gatherers employing pebble tools, waisted flaked blades and small flake tools — a period of perhaps 25,000 years, followed by;

Phase II: a pre-sweet potato neolithic horticultural phase associated (at least in some places and during some parts of the phase) with lenticular (oval) sectioned ground-stone axe/adze blades and a complex of stone pestles, mortars, clubheads and figurines, some of which suggest pottery and bronze prototypes; followed by; <u>Phase III</u>: the development of contemporary sweet potato horticultural systems, disappearance of the pestle and mortar complex, and spread of planilateral-sectioned (flat sided) polished axe blades in the Wahgi and Jimi Valleys.¹

From the perspective of prehistory then, the societies of the Highlands as they are known in the ethnographic record represent evolved or transformed neolithic horticultural economies which have developed out of (or perhaps displaced?) earlier forms of paleolithic and neolithic society in the region.

If (to return to the concluding suggestions of section/1/) Duna society in the ethnographic present is to be placed not only in a comparative perspective with other ethnographically-known societies, but compared as well with the societies of New Guinea's past (and perhaps with a reconstruction of its own past), then two considerations immediately emerge. First, since prehistoric societies are known by their remains, it may be that any ethnographic base of comparison must be reduced to what amounts to little more than the material remains of the ethnographic present. What we know of religion and of political affairs, for example, will be particularly difficult to trace in the prehistoric record. Second, since prehistoric societies are arranged sequentially in time and not merely contemporaneously in space, it follows that a dimension of time or history must be introduced within the problem of anthropological understanding. One cannot simply compare Duna society with other New Guinea societies as in a structuralist exercise where only similarities and differences are noted while the societies themselves remain as discrete entities. Rather, it becomes necessary to contemplate how societies change and are transformed (or transform themselves?) from one apparent form to another. The conception of societies as discrete entities is undermined by the contemplation of their history.

121
Insofar as the anthropologist's knowledge of religion, politics and kinship depends on what people say and do rather than on material manifestations, it might seem that this knowledge cannot be integrated with the data-base of prehistory. But except as a formal exercise, it is not really necessary to reduce the ethnographic present to its material remains and nothing more. Both prehistorians and anthropologists have been working to bridge the gap between what can be discovered by their respective methods and what can be deduced for the corresponding data-base of the other discipline. Prehistorians (e.g. Allen and Richardson 1971) have concerned themselves with the reconstruction of kinship systems from archaeological data, and anthropologists (e.g. Heider 1967) have considered the problems of archaeological reconstruction from the perspective of known ethnographic facts.² Nor is it really necessary for the results of these investigations to be formulated into a complete method or theory of the relation between sociality and its material detritus, since something like a general theory for the problem already exists.

121

For prehistorians it has always been clear that the way forward consists in deducing the character of productive activities from the remains of material production, that the archaeological data consist of artefacts, of human products. (More: that a human skeleton, a coprolite or a bit of plant refuse may be understood as a product of human activity as much as a polished stone axe blade or an entire stone temple). But for anthropologists the matter has been more difficult — why study human societies from the perspective of their material productions when it is possible to listen to and speak with the people themselves, "to grasp the native's point of view, his relation to life, to realise *his* vision of *his* world" (Malinowski 1922:25)? The data of anthropology tends to introduce a mentalistic or idealistic bias into the anthropological project of understanding, just as the data of archaeology tends to make every prehistorian a materialist.

But despite the temptations, anthropology has developed a body of materialistic theory. The Darwinian tradition no doubt had much to do with this. Certainly when Hobhouse, Wheeler and Ginsberg published their

essay on The Material Culture and Social Institutions of the Simpler Peoples in 1915, they did not doubt that the purpose of their exercise was to inquire into social evolution. What was in doubt was whether it was possible " ... to find some one characteristic which would be generally regarded as essential to civilisation, as possessing real significance in the life of a people, and as advancing in some determinate direction, which can be recognized and measured with some facility, and of which tangible evidence can be obtained" (p. 5). Hobhouse and his colleagues chose material culture (or "the control of man over nature") as the essential characteristic. They demonstrated, by a cross-cultural tabulation and correlation of stages of material culture and social institutions, that there was indeed "... a growth of [social] order corresponding roughly to the industrial advance [of culture]". (p. 254). The fact that their method produced intelligible correlations seemed to them sufficient reply to any objection that their choice of material culture as the criterion of social evolution "implies too materialistic a view of human society" (p. 6). Consideration of their findings, however, led them to observe that the advance towards civilisation via material control over nature had not resulted in any improvement in human relations. Thus, their closing words in the essay:

12/

On all sides social and economic differentiation replace the comparative equality of the hunting peoples. The extension of order is also, upon the whole, an extension of subordination (p. 254).

Surprisingly, Hobhouse, Wheeler and Ginsberg seemed unaware that they were repeating conclusions reached by Morgan in 1877 (Ancient Society) — perhaps Engel's contention that there was a conspiracy among British academics to surpress Morgan's evolutionary theories may have had some truth in it (cf. Terray 1969a).

Evolutionary and materialistic theories have developed hand in hand in the decades since. Interest waned in Britain with the rise of functionalist, structural functionalist and finally structuralist theories, but in America the theoretical focus on culture, combined with the notion that culture was an "adaptive mechanism", promoted the development of "theories of socio-cultural evolution": White (1943), Steward (1941, 1953), Meggers (1954), Parsons (1966) and Lenski (1970). The focus in these studies was on the part played by technological adaptation to the environment in promoting/retarding change, and on the "direction" of social evolution.

121

More recently, intellectual influences deriving from these and other sources (such as cybernetics) have fed into an anthropological school of materialist theory minus the evolution, a negative feed-back school of cultural ecology. Attention is focused upon the minutiae of adaptation to the environment while a more or less implicit assumption of stable homeostasis replaces the previous concern with social and cultural change (e.g. Vayda, Leeds and Smith 1961; Rappaport 1967 & 1971; Shantzis and Behrens III 1973; cf. Meggitt 1972 - to cite examples concerned with the interpretation of New Guinea ethnography). In contrast with the grim recognition by the early evolutionists that the future of technologically simple societies lay in the direction of increasing inequality, these recent theorists appear dedicated to a Panglossian conception of the primitive world as invariably operating in its own best interests. Stability is substituted for change, the direction of evolution becomes irrelevant and history is dropped from the problem - except for the intervention of the outside world, which usually upsets the delicate balance of the cybernetic mechanism.

If history is permitted to enter the anthropological problem posed by New Guinea, it seems necessary to consider Engels' proposition that:

...within this structure of society based on ties of sex, the productivity of labour develops more and more; with it, private property and exchange, differences in wealth, the possibility of utilizing the labour power of others, and thereby the basis of class antagonisms ... (1884 *Preface*).

For Engels primitive societies were undoubtedly a part of history. The developing productivity of labour assured by technological innovations prevented them from remaining in perpetual stasis. But for some reason, increased productivity which results in increased wealth must necessarily lead to an increased inequality. With inequality comes exploitation, and with exploitation, class antagonism. The process of

production of material wealth seems to feed upon itself and expand until it suddenly explodes in the dissolution of tribal society. In place of the "ties of sex" stands a new set of relations, which are characterised by conflict between antagonistic social classes. Engels places tribal societies in the context of history, but he does so by introducing (in the language of cybernetics) deviation-amplifying positive feed-back circuitry into their systems. Such a solution may be almost as extreme as the a-historical explanations of recent theorists. For if Engels' vision is true, it seems that within each primitive society there are automatic tendencies towards expansion and the dissolution of old social forms. Each society seems to contain a dynamic which produces a new society from within itself. As Gellner has recently written of Soviet ethnographic theory: "The whole Marxist idea of a sequence of inherently unstable stages, ever propelled by inner strains into new forms, leads to a kind of terribly foreshortened vision of human history ... (1975:597). Instead of societies which can be classified into taxonomic pigeon-holes or situated within a structural paradigm, one must deal with them as if they exist only in the process of becoming, not as things in themselves. Instead of being, one encounters becoming - and this becoming is simultaneously a coming-intobeing and a dying-away of the past.

But though it may be difficult to think, it is precisely this sense of sociality as a becoming rather than a being which is the main attraction of an historical, dynamic approach. Ethnography need not be interpreted as a closed system of inter-related consistencies and integrated institutions. Rather, one can read ethnography as a continuous process in which elements out of a declining past appear inextricably mixed up with and often in contradiction to emerging elements pointing towards as yet unrealized futures. More, this collapsing and mixing of elements can be recognized as a realistic portrayal of societies as they are actually encountered in the field by anthropologists, societies which are experienced not so much as societies but as Heraclitian on-going flows of sociality (cf. Wagner 1974). To appreciate the value of a dynamic representation, consider how close the ethnographic present of the New Guinea Highlands appears both to its paleolithic past and to its own emergent (but now aborted) future. In relation to the total time-depth of human occupation of the Highlands, phase II (pre-sweet potato horticulture, wide-spread 5000 years ago) appears as a relatively recent transition, while the development of the sweet potato-based economies of the present is as if only yesterday.

Similarly, Watson has called attention to the apparent paradox of a markedly paleolithic character in the material culture of the ethnographic present:

The fairly obvious point may be made at the outset: the material culture of all the Highlands peoples so far reported is either portable or expendable. They produce no monumental art, stone, or earthworks, large structures such as the "house tambaran" with carved posts, canoes, slit gongs, or the like. Their implements are simple, such as the digging stick, wooden spatula for turning the soil (in some areas), bow, arrow, shield, spear, club, and small tools and containers of bamboo, bone, chipped stone, or wood. Only the polished stone axes are of great value and not readily replaced, and these are portable ...

At present, the chief cultural commitment to stable residence is found in the extensively fenced and ditched gardens, dwellings, houses, and in some areas, watchtowers and palisades ... The lack of notable additional impedimenta is consistent with a long history of nomadism and a short one of intensive, sedentary gardening (1965:303-4).

Watson's observation suggests a present that has barely emerged from its past, although it poses the further problem that this past appears as a nomadic (hunter/gatherer?) past and not a past of sedentary, pre-sweet potato horticulturalists such as one might associate with the vanished pestle and mortar complex. (While it is not impossible that these artefacts were the portable possessions of nomadic peoples, the labour involved in their manufacture and the sophistication of their technology is more suggestive of sedentary monumental art or of the woodcarvings of a Sepik village than of the productions of nomadic peoples. Certainly nothing as elaborate as New Guinea's decorated stone mortars, with pestles surmounted by bird's figures, is known from all of Australia).³

At the other end of the time-scale, certain hints suggestive of a possible future appear in some accounts of the ethnographic present. Consider the description of Mbowamb society by the missionary and ethnographer Vicedom, who arrived at Mt Hagen in 1934. Vicedom described a population divided into eight stratified classes, "clear social strata within the population, whose members also have differential access to the means of production and power"." The top four classes were those who participated in the ceremonial exchanges of valuables called moka. The lowest of these top classes were described as a kind of middle-class, able to participate independently in the moka, but also sometimes working for their "big-man" political leaders. The remaining classes are described as lacking independent means. Since they were mostly war refugees without land of their own, their position in the tribal society was analogous to that of a landless proletariat in early capitalist society. The upper lower-class men were able to marry and cultivate their own gardens, (presumably acquired from their wives' clans?). The wue korpa ("rubbish men") and wue wangen ("bachelor men") are described as "servants" and "slaves", slovenly and dirty men with no pigs of their own, who work for the rich and the wives of the rich, and have little chance of ever marrying and improving their position. Although Vicedom recognized that he had described Mbowamb society in European terms, and that class distinctions among the Mbowamb did not destroy the unity of the clan, nevertheless differences in wealth, the possibility of utilizing the labour power of others, and thereby the basis of class antagonism, are all present in his account. It seems only a matter of prejudice whether the ethnographer chooses to emphasise the unity of the clan in kinship, and thereby arrive at a static account, or to emphasise the inequalities of Hagen society and the possibilities through further wars of conquest for the formation of an early state. .

To compound the apparent paradox, the appearance of rudimentary forms of class-like relations in Hagen society exists contemporaneously with the simple, nearly paleolithic, material culture described by Watson. Either the historical process is unfolding itself with an unexpectedly sudden speed, or the combination of primitive technology

with advanced social relations of production must be accounted for by some freak occurrence, like an intrusion or even an inversion of geological strata, in which relations of production have developed to a certain point and then dislocated from their technological/material matrix (e.g. the pestle and mortar complex) and justaposed against an earlier or perhaps pseudo-archaic techno-/material stratum (cf. Levi-Strauss 1952 & 1955, the latter for the geological metaphor).

So far it appears that the introduction of (pre-)historic data into the problem of anthropological understanding poses the problem of transformations, of how societies change from one form to another. The process of transformation appears to operate via human production. But human production is evidently of two kinds. There are the material productions, the artefacts, the tools, the refuse, the bones. But there are also the immaterial productions, the ideas and beliefs and the social relationships which are supported by them. Materialistic theorists have argued that material productions were easier to deal with objectively, or that they were the essential part of the entire social apparatus, or both. Idealistic and mentalistic theories (generally the theories of anthropology for the most part) have emphasized the primacy of relationships, and of the symbolic systems by which human beings manage to operate their relationships. Since ideas and loaves of bread (or decorated mortars and pestles) are always found in association with each other, it seems reasonable to suppose that the production of ideas, or of relationships from ideas, and the production of material artifacts are inter-related. The question is whether either side of the relation can be thought of as being in dominance, as being the more essential component in determining the course of change and its rate.

Even if this question can be answered, processes internal to both forms of production remain obscure. From Engels' perspective, it appeared that technological innovations were the driving force behind the increasing productivity of labour which was obviously the basis of the social formation. But how do technological innovations come about? Why do they come when they do, spaced in a certain pattern in time to create a technological history, instead of all bunched up at once? In class-based societies it seemed clear that the inter-play of social relations had an effect on technology, by creating leisured classes, specialists to create technology and/or slaves to make it redundant. But would the same effects be present in primitive societies based on relationships of kinship rather than class?

26.

The question of the nature of immaterial production, of the production of ideas and of relationships based upon them, seems even more obscure. Levi-Strauss has approached this problem from the perspective of an anthropologist who includes history within his problematic, but does so with a fundamentally idealistic or mentalistic intent. In *The Savage Mind* Levi-Strauss explores the properties and principles of what he conceives of as the wild or undomesticated mind of early man. In the course of his exploration, Levi-Strauss touches upon some of the same problems of social transformation covered by the materialists. Of particular relevance here is the distinction proposed by Levi-Strauss between "hot" and "cold" societies (1960; 1962:233ff.).

For Levi-Strauss, "hot" societies are societies which have embarked on courses of social change, while "cold" societies appear determined not to change. Levi-Strauss writes that "Although they exist in history, these societies seem to have elaborated ... a particular wisdom which incites them to resist desperately any structural modificaton which would afford history a point of entry into their lives" (1960:46). The "particular wisdom" that Levi-Strauss refers to is the wisdom of those "regular" and "crystalline" structures which, he maintains, are most readily to be discovered in the realms of cosmological belief, myth and ritual. How is it that some societies appear dominated by these "structures" while others achieve a dominance. over them? Levi-Strauss offers two suggestions. First, he places the threshold between "hot" and "cold" at the neolithic revolution. Prior to the inception of agriculture, all societies were presumably "cold". Secondly, "hot" societies are non-egalitarian. Not all agricultural societies appear to have embarked upon courses of social change, but in those that have, Levi-Strauss tells us that "differentiations between

castes and between classes are urged unceasingly in order to extract social change and energy" (p. 47). Within this perspective the horticultural societies of New Guinea have crossed the first threshold, that of the neolithic revolution, but stand not yet on the verge of the second. They are (or rather, were) neolithic societies showing as yet only incipient signs of social stratification and accelerated change.

But useful as the metaphor of "hot" and "cold" is for an appreciation of the historical position of these societies, Levi-Strauss' formulation must be rejected. His metaphor reifies societies into self-determining beings which choose or refuse to follow particular courses. For Levi-Strauss, it is societies themselves (and not actual people engaged in concrete activities) who/which elaborate "structures", exploit class differences, extract social change and energy from living human material. Similarly, Levi-Strauss says that European and Asian civilizations "have elected to explain themselves by history" (1962:232) rather than by totemic classification. It is not possible to explore here the subtleties of Levi-Strauss' view of the relation between history, change and mentalistic structures. What can be noted is that his use of language side-steps problems in understanding the transition from one form of society (or variety of mental process) to another. Levi-Strauss provides a mentalistic mechanism by which we may understand the resistance of primitive societies to change: every technique, rule of behaviour and customary form of relationship in these societies is justified by the savage mind under the terms of a single argument: "the ancestors taught it to us" (1962:236). But he argues as well (e.g. 1962, ch. 1) that primitive mentality provides men with a genuinely scientific access to nature, that it effects the technological discoveries of the neolithic revolution. One and the same mechanism therefore serves in Levi-Strauss' reasoning both to explain stasis and forward movement through history.

With this much as background, it is now time to turn to an examination of ethnographic materials from central New Guinea bearing on the problem.

/3/ An Ethnographic Sequence in Central New Guinea

There is a point in the ethnographic record where history, material production, and the immaterial productions of men's minds all come together. In the Duna record there are those myths (narrations of true history, as pre-christian Duna understood them), which relate how men have acquired their technology, crops and other material necessities for their subsistence. One such myth, a tradition proper to the men at Yeru', begins by referring to the ground itself (the ultimate material "substratum" of human existence):

"Truly before, before all the men came here, the ground was continually moving about (*dindi dunduguya*, "ground earthquaking"). The ground at Horaile' changed places with the ground at Nauanda. Tumbudu country changed places with Oksapmin country across the Strickland. There were some men at Yerunda then. They said to themselves: "Why is the ground always shifting about? This isn't right! ... (related by Akipa of Horaile', March 1971).

One may perhaps recognize in this account a distorted recollection of a time when men themselves moved throughout the country, a time before sedentary existence and an increasing awareness of delimited areas of territoriality crystallized into a conception of the land as demarcated into bounded areas, each with its own history and genealogy of inheritors.¹

Whatever the significance of these opening remarks on the primal chaos of the ground of Duna country, the myth goes on to narrate how the earthquaking was stopped. A man on a mountain called Mima, in Ok country, calls out to the men at Yeru': "Your ground is shaking and shifting. I'm going to throw a stone from here to your place!" A monolithic stone came out of the sky like an arrow and penetrated the ground near Yeru' — the ground stopped moving. The man at Mima (a place either on the earth or in the sky) told the people to gather about the stone and he would throw things down to them at that point. First he threw something that was very small, but before the men could get it a python in a tree swallowed it. This was the secret of eternal life:

"Did you get it or not?" asked the man. "Au??h", said the python, belching. "Not so" said the men, "a python swallowed it". "Ah??!" said the man at Mima, "Bad! But never mind, I'll throw you something else instead". 131

Next the man at Mima threw down a variety of palena (bog iris), the original variety which was the basis of the unmarried men's cult. The man told them that it was for unmarried men, to make them grow strong and big, and he told them the associated spells and cult activities. Next, he threw down two further varieties of palena, one for unmarried men to protect their "skins" against contagious magic involving the use of excrement, another for married men, to protect their "skins" against the vaginal secretions of women. (The myth is silent on a crucial point: whether the primal men were immune to contagious pollution, or whether it was their exposure to contagion which dominated them in the primal state). The Mima man told them to eat the palena together with certain cuts of pork, and he told them the spells and ritual actions. The Ok men got these things first and wouldn't share with the others, but they ate the palena with human flesh instead of pork, and so its magic didn't work. But the Bogaia men got the palena from the Ok and used it properly, and later the Duna acquired it from the Bogaia.

Next, the Mima man threw down different varieties of nut pandanus. Different men got different varieties and took them to different places to plant. Next he threw down *hinia awa*, the original variety of sweet potato. There were no spells or rituals for these things.

Then he told everyone to put their fingers in their ears, except for the Ok people, and he told them their language. He told each people their language in turn. The Yeru' people didn't do as they were told and didn't plug their ears. So it is that they understand everybody else's languages. The people were also told what to wear at this time (previously they had been naked) and each group was given its distinctive form of dress.

Finally, the Mima man threw an *auwi*, a cult stone, and explained that although the people had received different languages and customs they nevertheless had a single origin (*tse*). In the future there would come a time when everybody would be hungry and "the ground wouldn't be right" so that things would not grow. Then the men who had the *auwi* should "go inside it" (that is, perform its ritual). Young men should

go to Huli country and others to Mima itself, and bring back the spadices of the pandanus palms of each country for the ritual, which would renew the fertility of the entire land.

30.

The myth concludes by relating the genealogy of the sons of "Hala", who were Hewa and Kora (Ok) and Yunua (Duna) and Kui (Huli) and Karukua (Ipili-Paiela) and Tsinali and all the other original ancestors of the ethnic groups of the Strickland headwaters. Duna conclude all their narrative histories with human genealogies, thereby locating original events in time (conceived of in terms of generations) and space (conceived of as a geneological or kinship space, as well as a geographic space). By bringing together all the peoples of the region into a single genealogy the myth in effect states that these events inaugerated, at a zero point in genealogical time, the separate ethnic histories of all the peoples of the (known) world. The myth is the Duna genesis story.

The myth says that man is mortal because he failed to obtain the first gift; only the python can shed his old and dirty "skin" and thus live forever. Men acquire the next best thing, magic to guard their skins against contagious "dirt". After the magic comes the foundations of material life, the cardinal food of the forest, *anga* (nut pandanus), and the cardinal food of the garden, *hinia* (sweet potato). After these come the different languages and ethnic customs differentiating people. Finally comes a further piece of magic, a remedial cult to restore fertility to the world by recalling humanity's common origin.

So far as the historical "accuracy" of the myth is concerned, from the perspective of an outside observer it can be noted that it is most unlikely that sweet potato arrived in the central New Guinea region before the ethnic differentiation of these peoples. It is also unlikely that the differentiation of domesticated and wild varieties of pandanus was an event contemporaneous with the arrival of sweet potato. For that matter, the man who told me the myth thought that all crops, and pigs as well, had been obtained by men at this time. The myth obliterates our notions of "real time" as absolute chronology and makes everything

happen at once: in the Duna genesis there is no history of crops, techniques or customs— all of the fundamental elements of material subsistence are in existence at the beginning of history. In place of a chronological (genealogical) history of the acquisition of different crops and items of material culture, the myth offers an enumerated series in which crops, language, customs of dress, and forms of magic are received in a particular *order* at a single point of time. This is an order of events transposed into an order of importances or priorities.

31

The first priority is life itself, but the primal men fail to obtain it. Instead they receive magical means of preserving and extending mortal life by cleansing themselves of pollution. Implicitly, the primal people were promiscuous (another myth relates how the primal men all danced together with their sisters - they were in the dark, the sun had not risen yet and they could not see). The magic of the bog iris plant can be seen as introducing the conscious notion of pollution into the world at the same time that it provides a palliative. Further, the palena is of different varieties, implying that pollution is of different varieties: the pollution which dirties a man's skin by bringing food into contact with faeces, and the pollution which dirties by bringing men into sexual contact with women. The original forms of magic therefore imply at the base of all social existence a set of distinctions: between men and women (who pollute one another), between men who have contact with women and those who do not, and between that which can be eaten and that which can not.

After these primary magics (and their implicitly associated distinctions of the social and the edible) have been received, people receive the chief foods of forest and garden. The pandanus palms come first, both domesticated and wild varieties, and these are propagated and harvested by men. Sweet potato comes second, and is planted and harvested by women. The people are then given separately their distinctive languages and marks of ethnic differentiation. When the sun rises they scatter to their respective countries, but the order of priorities is given a final, cyclic twist by the last gift, a magical means of restoring fertility to the soil by recalling the common origin

of all peoples. (Implicitly, the soil grows old and loses its vigor in somewhat the same was as does human "skin").

131

The Duna myth of the primal origin of humanity thus offers an ordering of magical and non-magical priorities. We can understand this order from our own theoretical perspective, the perspective in which the material and the ideal are opposed and questions asked as to their relative priority in relation to the flow of evolving sociality that becomes history. If we equate the magical with the insubstantial, and further equate food with the material factors in social existence, the myth seems to say that history begins with the priority of the ideal. For the Duna, the foundations of sociality are, at the very bottom, magical. Magic implicitly establishes the primary differentiations of social relations: men and women, unmarried men and married men. Social relations (which in the opposition of materialism and idealism seem to us suspended somewhere in the middle) appear to the Duna as resting upon the conceptual distinctions provided by magic. After these distinctions are created the fundamental material conditions of existence are added -food crops-and aligned with the social distinction between men and women to produce a primary sexual division of labour. But finally the order of priorities is represented as cyclic with the immaterial in dominance, since before the ethnic groups disperse they are told by the Mima man that their material needs for food cannot be indefinitely met without recourse to further magic. The foundations of society and history are thus, in the Duna view, first magical, then material, then magical again. The material and the magical are inter-related, but the magical begins the cycle while the material (through the inevitable increase of pollution and decrease of fertility in the world) brings it to an end, necessitating new magical beginnings.

So much for the native's view of his world on the plane of theory. Note, however, that the native's view of the order of priorities is expressed by an ordering of events deprived of their history. To understand this same problem from the perspective of ethnography we may begin with the native's end-point, the differentiation of ethnic groups. Like the primal time of the native's myth, the anthropologist thinks of

/3/

ethnography as existing in a timeless realm, the ethnographic present. The ethnographic present is, by convention, a historyless context within which it is possible to compare not only the Duna of 1970 (or of pre-contact 1950) with the Mbowamb of 1930, but to compare as well peoples at different stages in apparent social evolution. Within the ethnographic present it is possible to compare the hunter/gatherers of Australia with the horticulturalists of New Guinea as well as with ancient and modern civilizations. The problem, having abstracted all societies from their matrix in time, is whether any principle of order remains. Can we recognize any ordered sequence in the ethnography of central New Guinea? Or, on the contrary, does ethnography present us with only an unordered set, a non-sequence of contemporaneous examples?

A conventional approach to the ethnography of central New Guinea might proceed to order the ethnographic presents of the societies in the region according to their degree of ethnological resemblance, in somewhat the same way that historical linguistics constructs family trees of related languages. In fact, since language shows so much congruence with culture in general, an ordering based on the sum-total of differences and similarities in cultural traits would no doubt be much the same as an ordering based on language resemblances alone. In figure 3:1 I offer an intuitive representation of such an ordering, based mostly on linguistic evidence but combining subjective impressions of resemblances and dissimilarities from other realms of culture as well. Some differences in the ordering of the societies considered would no doubt emerge if the problem were fully operationalized and pursued in a formal manner-what I am interested in here is to suggest a principle of ordering more than any precise set of results. My diagram differs from the usual dendrograms of genetic relationship offered by linguists in that I explicitly allow for the formation of transitional or intermediate forms created, not by cultural/linguistic borrowing, but by the merging and synthesis of different ancestral forms Thus, I suggest that the Duna represent an ethnological amalgamate of ancestral forms originating from the Western Highlands (of Papua-New Guinea) and the Fly River/Strickland River area. Likewise, I suppose that the Huli have been formed under similar dual influences, and that



34.

Fly/Strickland influence

Figure 3:1 Suggested relationships of ethnological resemblance among some central New Guinea peoples.

this distinguishes them from their more easterly neighbours in Enga and Hagen country. The Telefolmin, Oksapmin, and Faiwolmin I see as deriving from a combination of Fly/Strickland and West New Guinea ancestral forms. The Bogaia, I suspect, represent an unusual case where a single ancestral form has differentiated into western and eastern branches which then recombine to create the form of the ethnographic present. Finally, the diagram suggests that the Saiyolof and Hewa (who are the northern neighbours of the Oksapmin and Duna) derive from northern ancestral forms (as all linguistic evidence indicates)² and are presently influencing their southern neighbours through relationships of cultural borrowing which are of recent occurrence and have not amalgamated with southern ancestral forms.

This suggested ordering of the ethnographic present re-introduces a dimension of time or history into material where their original effects have been transposed into synchronic similarity and difference. As an historical reconstruction it helps us to understand an order of things in the present. But what is the logic, or rational necessity, underlying

131

this order? On consideration it appears to be founded on little more than the accidents of geography, the migrations of peoples, and the random diversification of language and culture through processes of undirected change or "drift". As an ordering of data it may be that the suggested relationships represent what really happened in history, but the history which results from this procedure appears accidental and without direction. The order of societies within the diagram is in fact little more than their order in space. Indeed, this is hardly surprising when it is appreciated that the ethnological similarities and differences on which the order is based have been chosen without regard to function. Linguistic similarity is a matter of the external form, largely the phonology, of what is said-the content or meaning of what is said is ignored. Similarly, styles of dress and adornment, house styles and other ethnological aspects of similarity and difference, though they may have functional significance, are incorporated into the ordering on the basis of appearances alone. It is not what culture does or means that determines the ethnological ordering, but merely what it looks like. The only "direction" which can be expected in such materials is outward divergence. As history passes, ethnological forms become increasingly different.

A materialistic critique of such an approach to the problem of ordering might well complain that it is based on an over-evaluation of external appearances typical of idealistic science. (While most idealist theories of history impart a teleological direction to it, it happens that this one has no directionality at all. In a sense its effect is to nullify history by the same analysis through which it is discovered; it reveals relationships and events in the flow of time while insisting that these occurrences have no meaning or significance). A materialist theory, by contrast, would immediately propose the material infrastructure of societies as the basis for their ordering. By beginning with material production a direction and significance are automatically imparted to the resulting order: the increasing productivity of labour or "man's increasing control over nature".

Taking the level of food production as the most important factor in primitive economic structures, societies in the ethnographic present can be ordered in a sequence of increasing productivity. Ethnographically known production systems in central New Guinea differ among themselves in their degree of reliance upon hunting and gathering, and in their levels of horticultural production. As well, it can safely be assumed that the long-term trend of history in this region has followed a course in which the attenuation of paleolithic patterns of hunting and gathering has been paralleled by increasing horticultural production. Over the long term, history does appear to have some direction to it other than merely increasing differentiation. In its "real" details history may not have always followed this course-theremay have been regressive periods in which horticultural production remained static or dropped while reliance upon wild food resources increased. But if we take increasing productivity among the societies of the ethnographic present as a synchronic transposition of historical developments, we will be following in the ethnographic record a sequence parallel to the general historical trend. More, we will be constructing out of synchronic data a "history" with some apparent logic or meaning to it. My purpose in the remainder of this section is to present such a construction, pieced together from information available in the literature and my own observations in the field.

The Sequence

An example of a system of production largely dependent on natural food sources is provided by the Heve people, speakers of a Sepik Hill language who live in the Wogamus River foothills some 90 km north of Duna country (Dye, Townsend and Townsend 1968; W. Townsend 1969, and P. Townsend 1971). The Heve diet is 85% wild sago starch, with protein supplements from domestic and wild pig, fish, sago grubs, greens and other wild foods. Bananas and taro are cultivated, but contribute less than 5% of the diet. The extensive sago swamps in the area permit a settled existence, but the hilltop settlements are small, consisting of one or two houses, occupied by six to forty people.

131

Table 3:2. Summary of population and production characteristics of some central New Guinea peoples

Subsistence Base Zone of Occupation Total Population Population Pigs per People (altitude asl) Density Person 150-300 m wild sago; hunting and gathering 234 ? Heve .9/km² 250 460-1000 m Saiyolof ? shifting cultivation of taro; hunting and gathering .75/km² Baktaman 183 .20 - .35 500-1000 m shifting cultivation of taro; (total Faiwolmin = hunting and gathering ca. 3000) 1.8/km² Southern 463 .20 700-800 m shifting cultivation of sweet Hewa (total Hewa = potato; hunting, some gathering ca. 1500) 8-10/km² Oksapmin 6000 .4(?) 1000-(1500?) m shifting cultivation, taro and sweet potato with casurine fallow $10-40/km^{2}$ 13000 1.0 950-2000 m mounded sweet potato; intensive Duna shifting cultivation - gardens cropped for three to twelve years $10-100/km^{2}$ Huli 60000 ? 1600 m mounded sweet potato; fixed field system . $40-140/km^{2}$ 15000 2-3 1600-2400 m Raiapu Enga mounded sweet potato; fixed field (total Enga = system + shifting yam gardens 100,000+)

As people move away from permanent sago supplies their dependence upon both nomadic hunting/gathering and fixed gardening increases. The Saiyolof, again speakers of a Sepik Hill language, residing in the headwaters of the Strickland River 35 km northwest of Duna country, provide one example (Hatanaka and Bragge 1973). Saiyolof settlements consist of a single house each, surrounded by a garden clearing which also denies cover to would-be attackers. Taro and bananas are principal crops, with sweet potato said to be a recent introduction of two or three generations ago. Hatanaka does not indicate what proportion of the diet comes from gardening, but the dependence on natural food resources is such that the people spend much of their time away from their homes, hunting and foraging from a series of forest camps occupied for three or four days each. Hatanaka makes no mention of domesticated pigs. Birds, snakes, lizards, wild pigs and cassowaries are all hunted. Gardens, and with them house sites, are shifted yearly. Hatanaka maintains that there are no permanent territorial groupings. From her maps and tables it appears that the overall population density is around .85 persons per km2.

Another example of a population of similar density is the Baktaman people, living in the headwaters between the Palmer and Murray Rivers some 65 km southwest of Duna country (Barth 1971, 1975). Unlike the Saiyolof, the Baktaman and most other Faiwolmin-speaking groups live in nucleated villages which are shifted when new garden land is required. The overall population density for the entire Faiwolmin area is about .5 person per km². The Baktaman village contain 183 people living in three contiguous hamlets within the total Baktaman territory of 250 km2 (= .75 person per km²). Their main crop, taro, requires from 6 to 8 months to come to maturity and is cultivated in gardens which are cleared anew for each crop. Bush-fallow periods are 15-20 years or more. Sweet potato (which is cultivated as food for pigs) and bananas are subsidiary crops, while the gathering of marita and nut pandanus, breadfruit, wild yams and greens are all important. Sago supplies on the edge of Baktaman territory are utilized when people want to delay harvesting their taro. Barth describes hunting and gathering as an integral part of the Baktaman subsistence strategy, of equal importance to taro cultivation and pig raising. One hunter's trophy collection contained relics from 105 cassowaries and 90 wild pigs killed over a ten"

year period — suggesting a major kill every 2 to 3 weeks or a half kilogram of meat per day (Barth 1975:38). A census of the Baktamans' domestic pigs counted 34 sows and piglets, and a second census six months later counted 63 — an average of 48.5 pigs or .26 pigs per person. Over half of the Baktaman pigs are captured wild as piglets or acquired by trade rather than born to village sows.

13/

The Hewa are neighbours of the Saiyolof, living along the Lagaip River immediately to the north of Duna country. Sweet potato is here the main crop. While hunting is still an important activity, foraging by women has declined in importance. Houses are occupied continually, at least by women and older men. According to Steadman (1971) younger men go hunting an average of one or two days each week. Each average household of seven people produces enough garden surplus to maintain one or two domestic pigs. Pigs are fed irregularly however and garden failures due to drought, incursions by wild pigs, and the ravages of fighting between houses are not uncommon. Cultivation techniques are rudimentary and planting is accomplished by jabbing a stick into the unturned soil and pushing a length of vine into the resulting hole. Gardens are shifted yearly, but the distance between moves is evidently not so great as among the Saiyolof. Territorial groups are clearly in evidence among the Hewa, though they exist in a state of flux with some groups expanding while others dwindle and are replaced. Houses are occupied for two years with people travelling between the house site and the new garden. Settlements still consist of a single house each, but the Hewa commitment to sweet potato has no doubt contributed to the increased density of settlement (around 1.8 km²), together with a reduction in semi-nomadic hunting and foraging. The amount of game available to the Hewa has probably decreased by comparison with the Saiyolof or Baktaman. Women's contributions from gathering have almost certainly decreased, but a more productive and localized food supply of sweet potato and sweet potato-fed pig is available to fill the gap.

However, Steadman's data (1971) suggest that the southern Hewa whom he censused were perhaps failing to reproduce themselves.³ The cohort of women between the ages of 15 and 30 in 1968 amounts to 81

individuals. The 0 to 15 cohort which will replace these women consists of only 71 girls, some of whom will die before they enter the reproductive cohort. Steadman argues that Hewa food taboos systematically deprive women of meat, and he attributes Hewa witchcraft beliefs) to meat hunger and the guilty feelings of men who deprive women (see also Steadman 1975). There is a considerable difference between the protein needs of active men and lactating women. In Western populations an adult male manual worker requires 3600 calories per day and 45 grams protein. A lactating woman requires only 2700 calories per day, but 55 grams of protein. Since these differences are probably of similar magnitude in all populations, it may be suspected that protein deprivation of Hewa women over the long-term is showing up as a decline in the total popul-To make matters worse, the sex ratio in southern Hewa is strongly ation. unbalanced (255 males to 208 females), apparently due to women being murdered and/or married out to the Duna. The Hewa population has evidently over-reached its resource base, and is now in the process of reducing itself to manageable numbers. One must ask if this situation is the result of the sweet potato. Perhaps what has happened is that increased population density (double that of the Saiyolof) has outstripped the wild food resources of the area, while at the same time surplus sweet potato production has not increased domestic pig numbers sufficiently to fill the protein gap.

13/

Across the Strickland River from Duna and Hewa country live the Oksapmin people, whose system of production reveals a further degree of intensification." Sweet potato and taro are of about equal importance and are cultivated in separate gardens located so as to provide different optimal conditions. In sweet potato gardens, at lower elevations, the soil is roughly broken up and mounded slightly for each vine. The sweet potato surplus is sufficient to maintain an average of perhaps two pigs per homestead, a pig:human ratio of around .4:1. I formed the impression that Oksapmin men were more committed to hunting and the women more knowledgeable about forest resources than their Duna counterparts. But the productivity from hunting and gathering cannot have been very high, considering the extent to which forests have been transformed into grasslands and garden fallow near settled areas. In the Gaugutianmin valley, the original forest had been cleared almost



everywhere, and gardens were rotated among fallow plots planted with casuarina. The population density is around 8 to 10 persons per km², about the same as at similar elevations in Duna country, but the countryside is more open and devoid of forest. The increased commitment to intensive horticulture represented by Oksapmin methods of cultivation and garden rotation with fallowing permits the continuous occupation of the area by a sizeable population, but the surplus product is not sufficient to support a large pig population in addition to humans.

131

Among the Duna, hunting is more a pastime than a vital subsistence supplement. Wild pigs are rare at any distance from the Strickland grasslands, and the hunting of cassowary was formerly prohibited to all but the few men initiated into the kiria cult. During the time of my study very little hunting was done at Horailenda and the people were killing their hunting dogs in the interests of newly introduced chickens. However, from informants' accounts it would appear that men formerly went hunting for marsupials in the upper forests whenever the weather was good, particularly if there was a moon at night. While some men did not hunt at all, others might hunt on 3 to 7 days each month. Of equal importance were the harvests of wild pandanus nuts (anga ane) from the upper slopes of the Müllers. Groups of men accompanied by women to assist in the carrying would ascend through the cloud forests, stopping overnight in a rock shelter at 2900 m, in order to reach the harvesting grounds.⁵ Pandanus syncarps were broken up, smoked, shelled and packaged into leaf and rattan-wrapped bundles (anga dolu) weighing up to 25 kg. These bundles were traded for pigs or net-bags, or slowly rationed out to homestead members and guests. In addition to the resources of the upper forests, a number of minor resources are obtained in the forests near settled areas. Men obtain building materials, flint or chert, and bark fibres; boys snare birds, and women gather bark fibres, edible fungi and wild greens.

By comparison with the Oksapmin and Hewa peoples, the Duna consider themselves wealthy in domesticated pigs. In 1970 the 336 people of Horailenda reported keeping a total of 354 pigs, i.e. a pig:human ratio of approximately 1:1. Pigs are fed regularly each evening with up

h

to 3kg of sweet potato each, and the food requirements of pigs are a major consideration determining the extent of Duna gardens. Sweet potato gardens are cropped intermittently for up to 12 years before being left to fallow, although 31 to 4 years cropping seems to be the average. The technique of cultivation is based upon the construction of labour-intensive earth mounds (called mondo) which provide for a thoroughly worked soil structure, mulching and drainage. People say that the same area of a garden can be used for years in succession without noticeable depletion of the soil, presumably because of the practice of mulching, which is an integral part of the mounding system. Apart from making possible a stable and dense population on the land, the mounding technique makes possible higher production levels. Since the garden is not shifted yearly, the extra effort expended on complete tillage of the soil is rewarded by increased harvests not just once but by as many times as the mound is replanted. Before each planting the mound is broken up and reformed, but the effort required for this operation in an already tilled soil is perhaps little more than that required for rudimentary planting preparations in untilled soils. The mounding technique of sweet potato cultivation appears responsible, as much as any other factor, for the increased productivity of the Duna system as manifested in population density and an increased pig to human ratio.

131

Nevertheless, to reach this increased level of production a greater initial effort in soil preparation is required, and the customary division of labour among the Duna decrees that this labour is allocated mainly to women. Whereas productive effort in the Hewa and Oksapmin systems are approximately equally divided between the sexes, with women spending as much time and effort in planting, weeding and harvesting as men do in clearing and fencing, the Duna mounding system combined with their division of labour appears to result in unequal contributions of productive effort. Instead of clearing a new garden site each year, men clear the equivalent of a new garden site only once every three to four years. At the same time, to make, this apparent decrease in male labour possible, women are required to increase their labour by the amount necessary to achieve initial complete tillage and to maintain productivity through mulching. In broad outline the division of labour is the same

as in the less intensive systems — men clear the garden site and women cultivate it — but the technological innovation of mounding increases efforts on the cultivation side while reducing the time necessary for the clearing of new gardens.

The reality of the differences between the Duna productive system and those of the Oksapmin and other peoples who do not mound sweet potato was forcefully suggested to me by Duna companions who accompanied me to Gaugutianmin. "Oksapmin women don't mound gardens or look after pigs or anything" they observed, "These women are so lazy the men here are just paying for cunt when they marry".

A further example of increased horticultural productivity drawn from the same general region is provided by the Huli of the Tagari Basin. The basin has been almost entirely cleared of primary forest, so it may be inferred that productivity from hunting and gathering has diminished even beyond the level obtaining in Duna country. Sweet potato cultivation based on a mounding system similar to that employed by the Duna is the mainstay of production. The system's productivity may again be gauged by the population density and pig production it supports. Glasse reports overall densities of 62 and 68 persons per square mile (24 and 26 persons per km²) in the Central and North Basins, while examination of his map and census figures for Tunda parish suggest actual densities in settled areas of 100 persons per km². Glasse provides no direct information on the pig population, but the size of recorded compensation payments suggests a level as high as or higher than in Duna country. The natural fertility of the volcanic soils of the Tari area is an important factor in whatever increased production there may be, although labour intensive modifications to the environment may also contribute to the efficiency and maintenance of the system over time. Garden plots are permanently walled by raised earth banks planted with casuarinas and tanket, and deep ditches between plots provide for drainage and the control of pig herds. In the absence of any more detailed information it appears that labour-intensive investments in fixed improvements in the Huli system permit it to operate with a male labour component as low or lower than among the Duna.

as in the less intensive systems — men clear the garden site and women cultivate it — but the technological innovation of mounding increases efforts on the cultivation side while reducing the time necessary for the clearing of new gardens.

13/

The reality of the differences between the Duna productive system and those of the Oksapmin and other peoples who do not mound sweet potato was forcefully suggested to me by Duna companions who accompanied me to Gaugutianmin. "Oksapmin women don't mound gardens or look after pigs or anything" they observed, "These women are so lazy the men here are just paying for cunt when they marry".

A further example of increased horticultural productivity drawn from the same general region is provided by the Huli of the Tagari Basin. The basin has been almost entirely cleared of primary forest, so it may be inferred that productivity from hunting and gathering has diminished even beyond the level obtaining in Duna country. Sweet potato cultivation based on a mounding system similar to that employed by the Duna is the mainstay of production. The system's productivity may again be gauged by the population density and pig production it supports. " Glasse reports overall densities of 62 and 68 persons per square mile (24 and 26 persons per km²) in the Central and North Basins, while examination of his map and census figures for Tunda parish suggest actual densities in settled areas of 100 persons per km². Glasse provides no direct information on the pig population, but the size of recorded compensation payments suggests a level as high as or higher than in Duna country. The natural fertility of the volcanic soils of the Tari area is an important factor in whatever increased production there may be, although labour intensive modifications to the environment may also contribute to the efficiency and maintenance of the system over time. Garden plots are permanently walled by raised earth banks planted with casuarinas and tanket, and deep ditches between plots provide for drainage and the control of pig herds. In the absence of any more detailed information it appears that labour-intensive investments in fixed improvements in the Huli system permit it to operate with a male labour component as low or lower than among the Duna.

Since there is inadequate information on Huli pig production, it may be instructive to consider Feacham's (1973) pig census figures among the Raiapu Enga as suggestive of the upper limits of productivity possible within a Highlands pig and sweet potato economy. Population densities in the Raiapu region range from 42 to 140 km² and the horticultural system is based on open fields of large mounds, heavily composted and reported to have been continually cropped for at least the last 30 years (Waddell 1972). Feacham's detailed census shows that two Raiapu clans at the moment of readiness for the *Te* ceremonial exchange attained a maximum of 2.5 and 3.1 pigs per human. These ratios are maintained only immediately before the *Te*, which occurs every four or five years, and include pigs agisted outside the clan territory. Subtracting agisted pigs the ratios are 2.1 and 2.5 for the two clans.

44.

Interpretation of the sequence: intensification and history

The ethnographic sequence just described, arranged in order of increasing food production and decreasing reliance upon natural food resources, can be thought of as illustrating a process of intensification of horticultural production. The fundamental dimension is increasing production of food, but other dimensions appear to increase through the sequence together with food production. Most apparently, total population (taken as the population of the linguistic unit) tends to increase in line with increased food production. The amount of food produced evidently influences the number of children who survive to reproduce, so that the intensification of horticultural production becomes the intensification of human reproduction. Moreover, as food production increases so does population density: not only do societies become larger, but the distance between individuals lessens such that each individual tends to come into contact with more others. To the extent that population density can be taken as an index of the "density" of human relationships within a society, we may say that the intensification of horticultural production requires an intensification of sociality itself. The level of food production therefore appears to underlie (logically and materially) those more general processes that

FART OF THE OWNER

anthropologists know as sociality. The ordering provided by the material criterion of food production, unlike the ordering based on ethnological resemblances, has both a directionality and a far-reaching significance.

I have not attempted to provide a precise measure of food produced (the data will not allow it in most cases), but leaving wild food resources aside the domesticated food resources of these societies may be divided into vegetable and animal food, primarily tubers and greens on the one hand and pork on the other. Within the series pig production increases continually, but vegetable food production is not in perfect correlation. If pigs are fed on vegetable food from gardens alone, then the amount of vegetable food produced per person in each society should directly correlate with pig production. But in point of fact in all Highlands societies pigs forage for a part of their food requirements, so that humans only produce that part which the pigs do not obtain for themselves. As human population density increases, foraging resources tend to decrease, so that humans must produce more and more vegetable food per pig. Vegetable food production therefore tends to increase more rapidly than animal food (pork) throughout the sequence of intensification. Moreover, the Hewa example suggests that there may be points in the sequence of intensification at which human population grows with vegetable production, only to be undermined by insufficient pork (plus wild meat resources) production. (Had I included the example of the Chimbu in the sequence, it would be seen that pig production per person does not always keep up with human population size and density. The Chimbu have perhaps reached, at a much higher level of intensification, a situation of vegetable food/animal food imbalance similar to the Hewa example). Given the nature of human dietary requirements, pig production supported by horticultural production of vegetable food is probably of greater significance for population growth than vegetable production alone.

Taking pig production as a key index of horticultural intensification, and assigning some estimates where the data are incomplete, it is possible to place each society in an ordered series. To facilitate comparison with the ethnographic ordering, this series can be converted into a dendrogram by pairing together those societies closest to each other in production levels and then pairing the means of the resulting pairs:

/3/



Figure 3:3 Central New Guinea production systems paired by similarity of pig:person ratios (approximate data).

(Hewa, Baktaman and Oksapmin are assigned to a triplet because the intensification "distance" between Hewa and Baktaman is the same as between Baktaman and Oksapmin). Although the resulting "family tree" of resemblance of production levels is ordered entirely on approximate ratios of pigs per person in each society, it is interesting that the arrangement is not entirely dissimilar to the arrangement by ethnological resemblances. The Sepik Hill group of societies (Heve, Saiyolof and Hewa) is incorporated together with the Ok societies in the lower range of intensification, but Duna and Huli pair together and their mean pig:person ratio pairs with Enga in contrast to the other societies in much the same way that these societies pair together in ethnological resemblances. It appears that there may be some common factor at work relating the apparently "meaningless" ethnological order to the materially significant order of production intensity.

I proposed above (p. 34) that just as the ethnographic sequence of intensification could be seen as a transposition of the history of the development of production, so it was also possible to construct a "history" from the synchronic data of the ethnographic present. Now it appears that there is indeed some connexion between the "real" history of these societies reconstructed on an ethnological basis and their economic "history" conceived of as the development of their production systems.

47.

To what extent can the economic sequence be thought of as an actual historical sequence? Apart from the difficulty that all of these societies have been observed at roughly the same point in absolute chronological time (the period 1955 - 1975), there are two respects in which the sequence of intensification is clearly not an evolutionary (historical) series: the systems described lack a constant environmental and ethnological base.

To the extent that these systems occupy different environments which exert different environmental constraints, the sequence described cannot be taken as an illustration of a possible historical development within a single environment. The Saiyolof, Baktaman and Hewa systems, for example, operate within an altitude range between 460 m and 1000 m, while the Oksapmin, Duna, Huli and Enga systems are found between 1000 m and 2740 m. Taro and bananas are better suited to the lower range, sweet potato to the upper. At lower elevations the rate of decomposition of organic matter in the soil is increased, and the rapid growth of weeds poses a further obstacle to prolonged periods of cultivation. Extensive shifting cultivation of the Baktaman or Hewa type is practiced in lowlands forests up to 1100 m throughout New Guinea (Howlett 1967:ch.4) and the environmental conditioning of this pattern seems clear. It may well be that continuous mounding of crops and other intensive horticultural practices of Highlands-type systems cannot be adapted to lowlands conditions, so it cannot be assumed that intensive cultivation is a necessary future stage of some yet to be realized evolutionary development in lowlands systems. It makes better sense to suppose that environmental conditions have acted to arrest the development of lowlands systems at the level observed in the ethnographic record.

Just as the tendency for different levels of production intensity to correlate with different environments suggests the existence of environmental limitations on the process of intensification, so the existence of different production levels within similar environments suggests the degree to which the intensification process can operate independently of environment. The Oksapmin, Duna, Huli and Enga systems all operate within the general altitude range of Highlands systems, yet ---

13/

have very different production intensities. It may of course be that more specific environmental factors are involved. Much of Enga and Huli country are especially favoured with rich, volcanic soils, while some parts of Duna and Oksapmin country appear degraded from long periods of cultivation with insufficient intervals of fallow. But there are still large tracts of unused forest country in both areas, and it seems likely that with increased inputs of labour and/or technological skill correspondingly increased productive outputs should be obtainable.

48.

Similar considerations apply to the ethnological base: the correlation of higher production levels with Western Highlands (of Papua New Guinea) ethnological influences suggests an ethnological factor enabling the intensification of production, while differences in productivity within ethnic groupings suggests the opposite. The Heve, Saiyolof and Hewa-all speakers of languages within a single family-provide an example of the latter. Although the production systems of the Saiyolof and Hewa have evolved in a different environment from the sago swamps of Heve country, it makes sense to think of these examples as successive stages accompanying the geographical expansion of a single ethnic stock. The Saiyolof can be seen as the Heve minus their sago, the Hewa as the Saiyolof plus sweet potato. But between these peoples and the Duna, Huli and Enga there is little ethnic continuity, little to demonstrate that a transition from extensive, low productivity horticulture to intensive, high productivity systems can take place as an internal development of technologies, production practices and relations within a single ethnic stock. Although it would seem probable that the Highlandstype system now operated by the Duna has evolved out of an earlier system of Hewa or Baktaman type, the appearance in the ethnographic sequence of an ethnological break at precisely the point where productivity also shows a marked increase certainly seems suspicious. The process of intensification, if there is in fact any such general process operating within the ethnographic sequence, seems to require both a Highlands environment and a particular type of Highlands culture. What the features of this type of culture are and how they enable the intensification of production remains to be elucidated.

A final consideration will introduce the next section. It will be noted that the subsistence base of all the high intensity systems of production is the sweet potato. In the low intensity systems the subsistence base is more varied. The Heve depend upon sago, the Saiyolof have bananas and taro with sweet potato as a recent acquisition, the Hewa have sweet potato, and the Baktaman and Oksapmin have taro and sweet potato with the latter cultivated especially as food for pigs. As the Hewa, Baktaman and Oksapmin examples show, possession of the sweet potato alone does not automatically bring about the intensification of production. But the association of sweet potato horticulture with high levels of productivity, combined with the evidence for its historical recency in central New Guinea, raises certain questions. Could it be that prior to the introduction of the sweet potato there were no intensified systems of horticultural production in this area? Could it be that the ancestors of the Duna, Huli and Enga operated production systems resembling those of the Baktaman and Oksapmin up until a few hundred years ago? Perhaps even the Baktaman, Oksapmin and Hewa systems are at the moment of the ethnographic present in process of transforming themselves into systems of intensified production based upon an increasing reliance upon the sweet potato.

49.

/4/ An Ipomoean Revolution?

To conceptualize development of the productive forces and accompanying societal transformations as a consequence of the recent introduction of the sweet potato, Watson (1965a) has proposed the concept of an "Ipomoean Revolution"-"to designate that which has developed with the adoption of the sweet potato, Ipomoea batatas, or that which is attributable to it" (p.443). Specifically suggested by Watson as consequences or developments of the "Ipomoean Revolution" in New Guinea are complete tillage of the soil, lessened dependence upon other cultigens, increased human population, increased pig population, more permanent and larger local groups, changed work patterns with more leisure for men and more labour for women, changed relations between men and women characterised by sexual antagonism, and increased warfare due to competition for land as well as increased male time free from subsistence activities. With the exception of sexual relations and patterns of warfare (which I have not so far considered), all of these developments are evident in the ethnographic sequence in central New Guinea.

At a seminar held in Canberra in 1967, Watson's "Ipomoean Revolution" was subjected to examination by a multi-disciplinary panel. The seminar report (Brookfield and White 1968) was largely critical and negative in tone. Much of the criticism was based upon recent archaeological findings in the Wahgi Valley, findings not available to Watson which clearly demonstrated the existence of intensive cultivation methods in pre-Ipmoean times. On the basis of this new data the seminar group concluded that "no Ipomoean revolution is necessary to explain the evolution of intensive methods of agriculture, and the question is thus turned back properly to that of population concentration" (p.50). Since intensive practices were in existence before the arrival of the sweet potato, the sweet potato itself could not be taken as the key to intensification. The seminar group offered the concentration of population as an alternative explanation, with intensive cultivation practices seen as a natural outgrowth of population build-up within an area. As

* . _____

/4/

to the causes of population build-up, "all inferential demographic evidence ... suggests that the present large [Highlands] populations were built up through an irregular growth over a very long period of time" (p.45). The seminar report did not specify how long a period of time the group had in mind, whether dating back to the beginning of the Bulmer's Phase I or only commencing with the relatively recent Phase II for example. However, the general idea seemed to be that the growth of population has taken place so imperceptibly that no causal mechanisms need be considered. Watson's speculations were implicitly consigned to "the perilous quagmire of conjecture", while the seminar group accepted that population growth was the sufficient and autonomous cause of intensification. Against any suggestion of sudden and rapid change conveyed by Watson's revolutionary idiom, the seminar group advanced arguments reminiscent of uniformitarian principles in geology: everything that has happened has happened slowly and gradually over a long period of time.

Perhaps part of the disagreement between Watson and the Canberra group lies in different conceptions of what it is that constitutes revolutionary change. Watson proposes that the Ipomoean revolution was a subsistence revolution, "comparable to the adoption of the horse on the Great Plains of North America or ... the adoption of the white potato in barley-growing Ireland", revolutionary in that the changes which followed have radically changed the appearance of the societies of the recent pre-historic past: "the inescapable implication seems to be that the Highlands which ethnographers have been examining for about three decades do not, in many fundamental respects, represent a long-The Canberra established or stable situation" (Watson 1965:441-42). group pays no attention to the notion of "subsistence revolution" and instead of focusing upon the technological/material nexus of the sweet potato examines only whether the changes suggested by Watson are indeed Although Watson's arguments are undermined to the "sweeping and recent". extent that presumed Ipomoean-induced changes can be shown to be of pre-Ipomoean origin, he is nevertheless following a definite tradition in assuming that basic changes in subsistence and technology can have "revolutionary" consequences. Marx (1856) referred to steam and electric power as "revolutionaries" whose radical potential lay in their

unpredictable possibilities. Men create technology but they seldom correctly envision the consequences which follow when these changes are realized within the contexts of specific production systems.¹ In the same way Engels (1884) wrote that the Irish potato was the last raw material to play "a revolutionary role in history", perhaps echoing Baron von Haxthausen's appraisal (1856: II:425) that the potato "has undoubtedly produced immense effects upon Europe, in the moulding and culture of which it has probably operated more powerfully than any other material object".

52.

Indeed, the Canberra group did not consider that the example of the white potato in Europe might have any relevance for the problem of the Ipomoean Revolution. One may wonder what interpretation might have been offered of Langer's (1963) argument that Europe's population explosion (beginning in the eighteenth century, of the same order of recency as the population explosion argued for by Watson) was due to the potato. Indeed the Canberra group's refusal to seriously consider the material underpinnings of demographic processes seems somewhat akin to the inability of our European ancestors to recognize the extent of their own reliance upon the white potato until the Great Potato Famine (Salaman 1949).

In any case, arguments both for and against the likelihood of a rapid growth of Highlands populations in the last two to three hundred years are crucial to both Watson's hypothesis and the criticism of the Canberra group. The seminar group rejected Watson's arguments in part because he postulated a rapid increase in population without specifying precise mechanisms by which sweet potato cultivation could have brought this about. Moreover, the rate of increase he proposed, 1.5% per annum (Watson 1965b) seemed too high in relation to demographers' estimates for non-industrial societies. Certainly, the very limited evidence then available for Highlands populations did not suggest rapid growth in the contact period. All this lent support to the assumption that populations in the Highlands were the result of "slow growth over a long period of time" rather than the consequence of "sweeping and recent" changes.
Demographic evidence from Duna country in fact confirms the group's assumption that present rates of population growth in the Highlands are generally low. Genealogical data for 190 women with completed reproductive histories (mostly the mothers of the current generation of adults at Horailenda) indicate 450 live births, an average of 2.6 births per woman:

Table 4:1 Completed sibling sets, Horailenda data

	Nı	mber	of	children	born	per	woman		
	0	1	2	3	4	5	6	7	8
Number of									
children	12	35	36	5 39	29	17	3	1	0

An average of 2.1 children per woman reportedly survived to maturity. Since not all the females reproduced, and since an average of 2.0 children reproducing themselves per woman would result in a stationary population, it appears that the population has either grown very little in the past generation or perhaps even declined.

By projecting backwards a rate of 2.1 children surviving to reproduce per woman, one can generate an exponential curve perhaps not unlike the picture of slow population growth which the Canberra group had in mind (figure 4:2, hypothesis I). In this projection the present Tumbudu Valley population of around 5500 people could have derived from a pre-Ipomoean population 300 years ago of 3000 people, or a population of 700 people 1000 years ago. Of course this is only a representation of average trends. As Bronson (1975) has noted, in areas as small as this the short-term fluctuations "completely overwhelm any secular trend toward gradual increase" such that "the exponential curve cannot be expected to resemble the actual histories of populations" (p.68). The Canberra group considered that long-term growth rates of 0.5% per annum were realistic, while the rate of growth by this projection is around Thus the demographic data suggests a growth rate closer to the 0.2%. assumptions of the Canberra group than to those of Watson's Ipomoean hypothesis, although even lower rates of growth would have to be



considered if one wished to assume gradual population increases beginning with the adoption of horticulture.

But the assumption that past growth rates were no higher than at present conceals the radically different consequences which can follow if slight differences in fertility and survival rates are postulated. The rate of 2.1 children surviving to maturity per woman may well be a recent phenomenon. Indeed, Duna themselves say that their population was formerly larger and has not recovered from a series of devastating epidemics which evidently began about 1930 (see Appendix A). The evidence of genealogies, as well as abandoned gardens above the level at which anyone now attempts to cultivate, both provide corroboration. It seems then that the rate of 2.1 surviving children may be based on a period of unusually high mortality. Suppose instead that prior to two or three generations ago each woman had 2.5 children surviving to reproduce. Such an assumption is not unrealistic. Polgar (1972) gives 2.35 children surviving per woman as a conservative estimate of the reproductive potential of upper paleolithic populations, and Angel (1975) estimates 2.6 children on the basis of early neolithic skeletal evidence from the eastern Mediterranean. A rate of 2.5 children surviving to reproduce is roughly equivalent to a per annum growth rate of 1.0%. Nelson (1971) has reported growth rates slightly in excess of 1% during a two year period in the Nebilyer Valley when the availability of malarial surpressants was the only major post-contact factor likely to have affected the rates (he believed that malaria has been introduced in only the last 30 or 40 years). And by basing population estimates on assumptions about ratios of persons to dance-grounds in the Kakoli (Tambul) area, Bowers (1971) has shown that rates of 1.5% probably prevailed over a seventy year period prior to epidemics about 1940.

The projection that results from the assumption of 2.5 children surviving to reproduce per woman (figure 4:1, hypothesis II) is more in line with the sudden Ipomoean population increase proposed by Watson than with the gradual population build-up suggested by his critics. The pre-Ipomoean population of the Tumbudu 300 years ago would have been less than 1000 or roughly 1 person per km². This is not far from the Saiyolof and Baktaman present population densities of .7 to .9 persons per km². To suppose a semi-nomadic or shifting nucleated population similar to the Saiyolof or Baktaman occupying the Tumbudu Valley 300 years ago does not seem unreasonable, although so far I have only argued for its plausibility, not its likelihood. What I am suggesting is that so far as the recent pre-history of the Tumbudu Valley Duna is concerned, Watson's hypothesis of an Ipomoean Revolution is no more conjectural than the Canberra group's assumption of gradual population growth unaffected by material changes in the subsistence base.

14/

What of the mechanisms of population growth which Watson did not attempt to specify? Recent thinking in anthropological demography has suggested a different perspective from that taken by the Canberra group. Instead of supposing that pre-industrial human populations are dominated by slow rates of gradual growth, constant over any long period of time, a number of recent studies of the population dynamics of hunter/gatherer societies (Birdsell 1968, Hayden 1972, Hassan 1975, Peterson 1975) have argued for the existence of regulatory mechanisms by which population growth is held in check relative to the group's available wild food resources. Paleolithic population levels are seen as largely static, Deevey for example writing that "over a long period of the Pleistocene there was a degree of population control and family planning that one would not have attributed to primitive man until very recently" (1968:248). Debate now centres on the precise nature of the regulatory mechanisms involved. Some theorists favour unconscious and automatic mechanisms such as the supression of ovulation by prolonged lactation due to the absence of suitable food for infants (e.g. Godelier 1975 following Howell), while others (Birdsell, Peterson) propose that more or less conscious regulation of population size is achieved through practices such as abstinence and infanticide. In a detailed examination of Australian evidence, Hamilton (n.d.) suggests that both conscious and unconscious mechanisms operate in varying proportion depending upon local environmental circumstances. An implication of all these studies, however, is that since Paleolithic populations were static in the long-term, gradual population build-up could not be the cause of the adoption of neolithic practices of food production. In contrast to earlier theorists who saw

14/

in agriculture/horticulture/domestication a response to increasing needs brought about by population increase and/or resource degradation, the new demographic perspective suggests that hunter/gatherer societies maintain themselves in a state of zero population growth until they adopt or invent the technological innovations of food production.

Here we come upon a point of intersection with the problems of horticultural intensification and the Ipomoean Revolution. The Canberra group argued that intensification was a response to population build-up and, furthermore (Brookfield and White 1968:45), that "there is no evidence whatsoever" to support the hypothesis that the adoption of the sweet potato was accompanied by a shortening of birth intervals or increased fertility. But if it is correct to reason that the initial adoption of domesticated food production may not have been a consequence of increased population pressure, then the same may apply to the develop-And if it is ment of practices of horticultural intensification. correct that birth intervals substantially beyond the "natural" or uncontrolled cycle of around 2.5 years prevailed in the paleolithic, then neolithic population increases may be due to the suspension of regulatory mechanisms more/than to any direct effects on fertility or mortality. With the adoption of increasingly productive subsistence patterns, early neolithic societies removed the limitation to population expansion posed by their previous dependence on wild food resources. It can then be argued that the conscious regulation of population (e.g. by infanticide) was dropped, or that fertility increased because the availability of supplementary food for infants meant that ovulation was no longer suppressed by constant lactation, or both. Following this line of reasoning, the hypothesis to be investigated is whether or not the adoption of the sweet potato could have been followed by another loosening of constraints similar to that proposed for the original horticultural/ neolithic revolution.

Unfortunately, the data so far available on the population dynamics of non-Ipomoean populations in central New Guinea are too limited to be more than suggestive. Townsend (1971) found that among the Heve 11% of infants were killed at birth, while sickness resulted in additional

10.15

141

deaths bringing total mortality in the first three years of life to 43.2%. Heve women said that they killed infants (mostly females) when elder siblings were still being nursed and it was thought that both could not survive. Since ample carbohydrate food resources were always available in the sago-swamp environment, Townsend suggests that the limited availability of protein foods was the principal factor compelling women to maintain a prolonged interval between births. A two-year postpartum taboo is reported, and infanticide is resorted to in instances where the taboo has not been observed. The post-partum taboo obviously requires the co-operation of the men, but infanticide seems to be a woman's decision alone. It would appear that women act in consideration of their own immediate capacity to provide for their infants, and not with any notion of limiting the total population in relation to the available resource-base. Nevertheless, family limitation does seem to result in a near-stationary Heve population as a whole. Among 25 women with completed reproductive histories there were 132 live births, of which 66 survived to reproductive age (= 2.64 surviving children per woman). On this basis the population would appear to be growing, but due to the differential incidence of female infanticide and other causes of female infant mortality, 52.2% of females die before weaning (compared with 33% of males). These figures suggest that the 25 women had 31 female children surviving past weaning, of whom six might easily die before reaching reproductive age.

The Heve would seem to be one of the few New Guinea peoples known to practice infanticide regularly. Bulmer was able to report only one other example in his survey of the Melanesian literature (1971), that of the semi-nomadic Sengseng of New Britain. Although both the Heve and Sengseng have small gardens, their general reliance upon wild food resources as well as their residential patterns suggest that we are here dealing with social formations of a paleolithic character. The presence of post-partum taboos and infanticide in both groups is in conformity with the hypothesis that regulatory mechanisms operate to limit population growth in pre-neolithic societies, but it seems doubtful whether any demographic evidence could ever disprove the counterhypothesis that a gradual population increase may nevertheless occur, thereby forcing the adoption of more intensive horticulture in the long-term.

141

Barth (1975) provides demographic information on the Baktaman, who serve as an ethnographic example of a low-intensity horticultural population. No mention is made of either post-partum taboos or infanticide. From his data on completed sibling groups (p.272) it appears that 48 women with completed reproductive histories (the mothers of Barth's informants) had a total of 172 live births with a 10% loss due to infant mortality. Barth characterizes the population as "low fertility, relatively low infant mortality, steadily high mortality through life and low life expectancy" (p.273). It is difficult to understand how the mean live birth rate (see table 4:3) could be so low in the absence of post-partum taboos unless the high rate of death by violence is terminating many women's reproductive careers early. Barth suggests that this is so, although his accounts show that men often try to take women captive and marry them rather than kill and perhaps eat them. It is not possible to determine from Barth's data what proportion of children survive to reproduce, although infant mortality is low and enemy children are often spared and incorporated into the group. Of even more interest, Barth tells us (p.166-7) that collective taboos in the Baktaman community enjoin a period of inactivity following every death and childbirth, during which "their population size and the crisis of their survival as a people are in fact discussed".

Looking at the Ok area as a whole (Barth 1971, British Museum 1966, Craig 1969, Rieckmann *et al.* 1961), the picture that emerges is of a congeries of small language groups ranging from 60 to 1000 speakers, arranged in nucleated villages of up to 300 people each, with endemic warfare between these highly endogamous local groups. There seems to be no attempt to limit the population, and men are concerned about population size and demographic competition with adjacent populations. Although women evidently have considerably fewer births than among the Heve, it appears that more survive to reproduce. Local populations are large in comparison with the Heve and appear to have a higher potential

59.

G

853

for reproduction, although the high incidence of violent death for both sexes may limit demographic expansion among all but the most successful groups.

Looking at the underlying subsistence base, taro is extensively cultivated and sago and sweet potato are secondary staples. Few pigs are kept, and wild pigs and other large game (except for humans) seem to be largely prohibited to women. It is tempting to speculate that a meat shortage exists for the women, since protein deficiency could result in delayed menarche and lower fertility (by comparison with the Heve). Protein deficiency is perhaps also a factor in the general practice of cannibalism throughout the area, particularly in view of Barth's report (1975:152) that although Baktaman regard human flesh as nutritious, many of them find it nauseating and are unable to eat it. I can find no information on infant feeding practices. Taro would seem to be less suitable than either sago or sweet potato as a supplementary food, and this may result in a greater dependence on lactation and hence further suppressed fertility.

 40 h	mean live births per woman	mean children surviving to reproduce per woman
Heve	5.3	2.6
Baktaman	3.6	3.0 ?
Duna (Horaile')	2.6	2.1

Table 4:3 Mean live births and children surviving to reproduce

Interpretation of the demographic data from Heve, Baktaman and Duna as an ethnographic sequence is risky because the small number of women involved may contribute to sampling errors and exaggerations of chance fluctuations. Nevertheless, the data are not inconsistent with the hypotheses suggested above. It is not reported what the attitude of Heve men is to population maintenance and expansion, but warfare and demographic competition seem not to be a part of the picture. Despite a post-partum taboo, Heve women are the most fertile of the three 14/

populations, but the practice of infanticide and the high infant mortality rate keeps families small and the total population near static. Among the Baktaman one finds that the switch to horticultural production is accompanied by an increase in population with a high potential for further population increase which is perhaps curtailed by internicine conflict. Baktaman men are anxious to increase their population and no conscious regulatory measures are practised, but fertility is nevertheless low. Protein deficiency is perhaps a factor. The Duna language group, like other language groups in the sweet potato-intensive areas of the Highlands, is much larger than Ok language groups, suggesting a history of further population expansion. However, post-partum taboos and a number of other cultural factors (detailed below) have reduced fertility even further, despite the availability of domesticated pigs as a source of animal protein. Since infanticide is not practised, it seems that the reduction in fertility is largely a consequence of men's decisions, and indeed Duna men are not overly anxious to have many children. The data are suggestive of a population which has recently come to the end of a period of expansion. The potential for growth is now low, but to the extent that this potential is due to male-imposed cultural practices it represents a somewhat different thing from the low potential of the high-fertility Heve.

Contrary to the assertions of the Canberra group, there are several ways in which sweet potato cultivation can be seen as leading to increased fertility and survival rates and hence directly contributing to population growth. Since the work of Rappaport (1967), anthropologists have become more aware of the importance of protein intake in providing resistance to disease. Bowers (1971) likewise suggests that availability of protein is one of the chief factors limiting population growth in the Kaugel Valley today. To the extent that sweet potato production enables people to maintain larger pig herds and consequently provides a regular source of animal protein, the health and fertility of an Ipomoean population may be expected to be better than that of a population relying upon other crops and unable to maintain so many pigs. /4/

Sweet potato-cultivating populations are also able to garden efficiently at higher elevations and so experience a lower incidence of malaria. Brookfield and White consider this second factor but perhaps underestimate its importance. My data on children surviving to maturity per woman are drawn from Horailenda, mid-way between the Aluni' and Hagini' Aid Posts and well within the malarial zone of the lower Tumbudu Valley (table 4:4). Malaria could be a major factor in child mortality, and survival rates in the relatively malaria-free upper valley could well be higher, although I have no direct evidence on this point. Indirectly, the average size of families in the upper valley is larger (table 4:5) and population densities are greater (table 4:6). Since upper valley soils are somewhat inferior and the maturation time for sweet potato longer due to lower average temperatures, the reduced incidence of malaria would seem a likely explanation of this increased population density. (Duna consider malaria a form of illness which their ancestors have always known).

There are thus some reasons for thinking that sweet potato cultivation, if it is pursued intensively and combined with domesticated pig production, can directly affect a population's fertility and survival rates. But in point of fact the actual rates observed at Horaile' are well below the rates of the taro-based Baktaman population. The Tumbudu population may have grown from a Baktaman-like population only 300 years ago, but to suppose this it is only necessary to assume the constant realization of the estimated Baktaman reproductive potential of around 2.5 to 3.0 children surviving to reproduce per woman. To assume that the adoption of sweet potato was a necessary factor in this growth does not at first sight appear necessary.

However, I would suggest that sweet potato was a necessary ingredient for two reasons. First, it seems likely that protein deficiency can affect fertility. While the Baktaman fertility rate is high enough to allow population growth, it seems doubtful that this rate could be maintained under increasing pressure on non-domesticated animal protein sources from rising population densities. The Hewa are perhaps an example of how far population density can rise before non-domesticated 1

Table 4:4

Admissions for malaria as percentage of all recorded Aid Post admissions, Tumbudu Valley, 1971

Aid Post location			Altitude asl		Admissions malaria		issions for aria
Aluni' (lower Naua Valley)		1. .+	1200	m		33%	(N = 1098)
Hagini' (middle Tumbudu)	< $>$		1400	m		18%	(N = 2655)
Kelabo (upper Tumbudu)			1600	m	1	9%	(N = 1111)

Tab]	.e	4:	5

Mean family size (families as they presented themselves for 1970-71 Administration census)

Location		Number of families	Mean number of persons/family
· · · · · ·	int 1		Er : ?
Upper Valley:		1.	je s
Kelabo	all families	203	3.6
	families with children	124	5.0
Harege	all families	112	3.8
	families with children	74	5.0
Naua Valley:	- Winn A I I I II I	1	and the second
Naua	all families	37	3.3
· · · · ·	families with children	19	5.2
Aluni	all families	62	2.9
	families with children	32	4.3
Combined data:	all familian	315	3.7
Upper	all lamines	100	5.0
Valley	families with children	190	5.0
Lower	all families	99	3.0
Valley	families with children	51	4.6

Parisi	h	Population	Area (km ²)	Density (persons/km ²)
Lower	valley:		•	
	Yeru'	131	20	6.6 a
	Aluni'	137	19	7.2
	Kunai'	60	9	6.6
	Haiyuwi'	131	8	16.8
	Naua'	120	16	7.6
	Horaile'	346	23	15.1
	Lower valley mean	154	16	9.6
Middle	e valley:		· · · ·	
	Hagini'	445	21.5	20.7
	Huguni'	160	7.5	21.7
	Porini'	86	4.5	19.1
	Middle valley mean	- 230	11	20.7
Upper	valley:			
	Harege'	340	9	38.2
· · · ·	Kipari' (Kelabo)	739	21	34.8
	Upper valley mean	539	15	.35.9
All pa	arishes mean	245	14.5	16.9

Table 4:6 Tumbudu Valley parishes and their population density, 1970-71

Estimates of area based on land within the altitude zone of cultivation only. Parishes from Yeru' to Porini' measured on pre-print issue of Oksapmin 1:100,000 radar map. Harage' and Kipari' measured from air photographs at estimated scale of 1:35,300. Parish boundaries determined on basis of local information. Parish populations determined on the basis of village census books checked against local information. Kunai' parish now largely abandoned and no longer censused; population given is a reconstruction for about 1940.

3

protein resources per capita fall to the point where fertility and survival rates cannot maintain the growing population. Second, the chief limitation on population growth in the Ok area appears to be the high level of violent conflict. The possibility that sweet potato cultivation, at least in the early stages of intensification, may have actually reduced rather than accelerated conflict seems not to have been recognized. Both Watson and his Canberra critics tended to assume the opposite. But Barth's data and Steadman's (1971) detailed study of the killing rate among the Hewa both reveal mortality rates due to violence among local groups with weak political links far in excess of Duna rates (see Part Four). As will be seen later in the thesis, pig production among the Duna is utilized to facilitate exogamous marriage between local groups and to regulate the rate of conflict between groups by requiring deaths to be countered with compensation payments of pigs. By comparison with their low-intensity neighbours, the Duna have achieved conditions of relative peace. More, they consider themselves as a people who have put aside the cannibalism of the Ok and, indeed, of their own earliest ancestors. An increased pig population supported by intensive sweet potato cultivation therefore appears to be a major factor in the emergence of more stable and regulated relations among local communities.

14/

Turning to the present low growth-rate in the Tumbudu Valley, it appears that this is due to a number of cultural factors which operate to depress the reproductive potential of the population. On the basis of data for the five most reproductively successful women at Horailenda, I estimate an interval of 2.9 years between births. A post-partum taboo on intercourse, enforced for the most part by women against the desires of their husbands, is apparently effective in lengthening the birth interval among the majority of women who bear far fewer children. I found no evidence for abortion or the regular practice of infanticide, even in the case of twin births where the survival of one or both infants is uncertain. The only contraceptive methods known by women appear to be refusal of intercourse or standing up immediately after intercourse to drain semen from the vagina.²

14/

More effective than measures employed directly by women in reducing the reproductive potential of the population are the indirect consequences achieved through the largely male-imposed system of marriage and regulation of heterosexual behaviour. Prior to changes brought about in the post-contact period (ca. 1964), the net result of Duna marriage practices was to substantially reduce the effective reproductive span of women. Men believed that women were not "strong enough" to bear children before "their breasts have fallen a bit" and the average age for first marriage of women seems to have been around 22 years. The average age for first marriage of men I estimated at 32 years. A consequence of this age difference at marriage was that many women were widowed before the completion of their biological reproductive span. The remarriage of widows was delayed or avoided for a number of reasons. Because sibling groups were small, the chances of a widow becoming an inherited wife to her husband's brother were lessened. Other men are required to pay brideprice for a widow (although deferred payments are common), and the unwillingness or financial inability of men to marry, combined with their fear that older women may have dangerous accumulations of tsome (poison, female pollution) in their wombs, as well as the independent-mindedness of older women, all contribute to an underutilization of reproductive potential. On the basis of Administration census figures locally rechecked I found that 8% of women aged between 20 and 35 years were currently unmarried in 1970 (Table 4:7). Finally, genealogical data show that women in polygamous marriages, especially second and third wives, tend to have fewer children than women in monogamous marriages. Since extramarital intercourse is vigorously opposed, all of these marriage-related factors combine to reduce the reproductive potential of the population.

But since these are factors of a customary nature, it is quite possible that their operation, and hence resultant fertility, could have been different in the past.³ Duna men are well aware that their late age of marriage is in excess of both their Huli and Oksapmin neighbours, although the reasons for this difference are far from clear.⁴ Some informants suggest that Huli men find it easier to accumulate their first bride-price; older men are more willing to help them, or perhaps

T

Table 4:7

		÷		
*	women aged	20-35	women ag	ed 36 +
Census locality	currently married	not currently married	currently married	not currently married
Pianngongua	58	11 (16%)	37	17 (31%)
Warukumun	80	8 (9%)	58	22 (27.5%)
Kagoma	36	2 (5%)	45	11 (20%)
Aienda	34	4 (10.5%)	51	15 (23%)
Kuniebi	44	4 (8%)	35	19 (35%)
Hauwinda	18	2 (10%)	_ 31	8 (20.5%)
Kelabo	102	8 (7%)	76	23 (23%)
Harege	61	4 (6%)	26	20 (43.5%)
Wagia	15	0 (0%)	14	4 (22%)
Huguni	32 6	5 (13.5%)	15	10 (40%)
Malane -	60	1 (1.5%)	22	17 (43.5%)
Hagini	53	1 (2%)	33	10 (23%)
Horaile	39	7 (15%)	23	24 (51%)
Naua	17	2 (10.5%)	3	3 (50%)
Haiuwi	22	1 (4%)	1	3 (75%)
Aluni	23	1 (4%)	6	9 (60%)
Yeru	8	3 (27%)	2	10 (83%)
Totals	702	64 (8%)	478	225 (32%)

Currently married women (Administration census in Tumbudu Valley 1970-71, locally checked)

12

young men possess more effective magic for pigs. Whatever the reasons, the accumulation of bride-price is a major obstacle to marriage for all Duna men, and thus for women too. The amount of bride-price is itself a matter of custom and several Duna informants said that the "right" number of pigs had been slightly lower in the past. Glasse (1968:54-55) reports regional fluctuations between 15 and 22 pigs in the standard price among the Huli, and some Tumbudu men thought that the Pori Duna had recently increased their standard price by five pigs.

Yet another factor is prevailing ideology about descent and the desirability of growth. Meggitt (1964) reports that Mae Enga men are anxious to marry early to increase the strength of their clan and their chances of themselves becoming lineage founders. Although Duna value numerical strength, their descent ideology is such that non-agnatic cognates are considered of equal value to agnates. Men tend to think about growth as being as much a process of annexing members from other local groups as it is a question of sexual reproduction from within the group. Ideologies, like bride prices, ages of marriage, and perhaps even sexual attitudes,⁵ thus show considerable variation within the central Highlands region. It may be that similar variations have occurred through time in the past. With cultural variations of this kind the possibility of variations in past fertility levels logically follows.

Labour and transformation

14/

There are reasons then for supposing that something like an Ipomoean Revolution could have taken place in Duna country during the last 300 years. A small population with demographic characteristics like the Baktaman could have practised shifting taro cultivation in the Tumbudu Valley. The revolution would have consisted in the arrival of the sweet potato and its utilization to produce a horticultural surplus for an increased pig population. With increased pig production, human population density could increase, since pigs as consumable pork would provide an adequate protein base while at the same time providing a basis for the ordering of social relations through their exchange. By 14/

facilitating exogamous marriage through their function as bride-price they perhaps contributed as much to the suppression of conflict and cannibalism as they did via their function as an increased protein supply. But if the key to such a transformation is an increased pig population, what is the functional necessity of the sweet potato? Why couldn't pig production be equally increased on the basis of other crops? The example of the Ok peoples-who cultivate sweet potato for their pigs but prefer taro for themselves-suggests two conclusions: that it is easier to grow sweet potato for pigs than to feed them on taro, and that possession of the sweet potato does not automatically lead to a surplus sufficient for a large pig population. The Ok peoples keep few pigs by comparison with peoples to the east of the Strickland. In pre-Ipomoean times they either maintained even fewer pigs, or they worked harder at supporting a pig population like today's on the basis of taro horticulture. The arrival of the sweet potato may have eased work-loads among the Ok, but pig production in excess of their present levels could/can only be achieved by enlarging gardens and producing more The problem of the Ipomoean Revolution now seems to be turned surplus. away from population build-up and focused instead upon inputs of labour. Enlarging gardens to feed more pigs requires that people work harder.

But an increase in labour is seldom an immediately attractive proposition for any human population. Duna men express their attitude towards work by contrasting the labour of gardening with the pleasure and adventures of hunting. The upper forest region is regarded as a men's domain, a haven of coolness and cleanliness away from the heat, hassles and filth of the homestead and garden. Men often emphasized to me their view that the making of gardens is hard work, that pigs eat too much, that the smell of pigs' faeces disgusts them, and that women frustrate their desires for increased production. Men must labour to prepare garden sites and struggle to resolve conflicts with women over the organization and distribution of production—and this cannot but compare unfavourably with the pleasures of male companionship in the forest and the unlaboured windfalls of hunting and nut harvesting. Songs and stories celebrate the adventures of the forest, and although hunting and gathering are perhaps never as productive in reality as they are in fantasy, men's imaginations dwell upon the forest more than upon the mundane realm of necessity represented by homestead and garden. For Duna men, somewhat in the same manner as for the worker under capitalism, participation in the sweet potato and pig system of production appears as something alien to their nature, "not the satisfaction of a need, but only a *means* for satisfying other needs" (Marx 1844). It is evident that Duna men do not find it an easy thing to support their pig population. For the Baktaman hunting is an integral part of the daily production of the means of subsistence; for the Duna it has become a recreation subordinated to the demands of horticultural labour. Unlike the Baktaman, the Duna have made the transition to intensive sweet potato and pig production, but their sense of alienation from subsistence production suggests that the transition has not been an easy one.

Theories advanced to account for the transition from one level of production to another, from lower intensity to higher, rely upon mechanisms of two general varieties — "push" factors and "pull" factors. "Push" factors emphasize circumstances that drive people into more intensive production out of necessity. The Canberra group's interpretation of prehistory relies upon the assumed dominance of push factors, as does Boserup's (1965) neo-Malthusian theory that population growth is an independent variable preceding and pushing people into agricultural development. "Pull" factors on the other hand emphasize the positive benefits that make increased intensity a desirable option for producers. Examples are provided by those theories which argue for the capacity of new technologies to return greater outputs for labour inputs. Both push and pull factors can of course be combined in a single theory. A dialectical view of social evolution, for example, might emphasize both the more or less autonomous development of the forces of production as a pull factor, and increasingly insupportable conflicts in the realm of social relations as a push factor. Or "contradictions" may be discovered within the unfolding of a new technology quite apart from the social relations involved. For central New Guinea a possible hypothesis is that initially greater returns to labour made sweet potato cultivation an attractive proposition, while subsequent deterioration of the naturally occurring wild food resource-base consequent upon increasing

population density then acted as a push factor leading to further intensification. For example, the introduction of the sweet potato among the Saiyolof may be acting as a pull factor converting their subsistence base and demographic superstructure in the direction of the Hewa. But declining returns to hunting among the Hewa may be acting as a push factor, leading to more intensive Ipomoean production and the maintenance of more domestic pigs.

Recently, H.C. Brookfield has advanced a sophisticated general framework for thinking about transitions both up and down the scale of agricultural intensity. His proposal can best be understood if I quote him at some length (Brookfield 1972:34-5):

Any given area, with a given resource endowment, can be considered to have a hierarchy of feasible agricultural eco-systems. The hierarchy is ranked by the complex of skills and technology involved, from least to greatest. If we then assume that the level of inputs into the system per head of a population is fixed, each system has a range of population capacities. The minimum capacity is defined as the population whose inputs are just sufficient to sustain the system in viable condition; the maximum is the population at which the marginal per capita return reaches zero. Between the two is a theoretical optimum for the system at which average productivity per capita is at a maximum, and beyond which average productivity will decline. The _ shape of the curves, and the distance between the three critical points, will vary greatly from system to system; ... the range of populations for each system will normally overlap widely with the range for the system above and below.

We now assume that populations will adopt the system which offers them the best average return for their inputs consistent with the principle of least effort: since a shift to a higher technology involves additional effort, at least initially, and will always involve difficult reorganization ... we may also assume that the simpler choices will be selected first, and that movement up the hierarchy will encounter increasing resistance ...

Now allow population to increase at a steady rate. Ideally the shift to each higher system will take place soon after average productivity under each system has passed its maximum, when population pressure will begin to be felt. But the change may be delayed because of resistance ...

While Brookfield provides no graphic representation of his argument, it is a simple matter to devise one (figure $4:\beta$).

14/

hierarchy of agricultural eco-systems

13

10 .



(food output)

Figure 4:8

Brookfield's view of intensification, represented as a graph of increasing population and food production.

Brookfield's framework here supposes the same autonomous and constant rate of population growth which he previously supported in the report of the Canberra seminar. The model invests population growth rather than technological innovation with properties of autonomous development, thereby making "natural" population increase into a push factor which forces people into changing their material conditions of production. For the sake of illustration different production technologies (T1, T2, T3, ...) are presented as discrete entities, although empirically the technological possibilities realized throughout Melanesia present so many gradations as to suggest a smooth curve of intensification without abrupt changes (Brookfield with Hart 1971:chapter 4). Gradual population growth then acts in a simple Boserupian fashion, boosting the material basis of subsistence production imperceptibly from one level of intensification to another. A major innovation such as the adoption of the sweet potato could, at most, act as a pull factor by encouraging population growth at the lower end of its associated technology curve, where marginal returns per capita are increasing rather than decreasing. Only in those instances where no new technology is available would natural population increase push the material conditions

of production beyond their optimal limits. As Brookfield notes, a condition of "agricultural involution" (Geertz 1963) would then develop, perhaps leading the population into an ecosystemic cul-de-sac.

From an anthropological perspective, it is apparent that Brookfield's model displays a geographer's predeliction for variations in population and agricultural technique, while ignoring the role of human labour and consciousness in the development of productive forces. Instead of assuming constant hours of labour per capita and autonomous population development, one can assume variable labour inputs per capita and humanly regulated population movements. Instead of assuming that societies are propelled passively from one technological system to another by naturally increasing population and the principle of least effort, one can assume that the transformation of production systems begins with active human intervention. Hours of labour can be increased or decreased, or labour can be allocated unequally, thereby shifting a given population up or down along a particular curve of technology, or from one curve to another.

Empirical observations lead Brookfield to rather similar conclusions. In his 1971 study of Melanesian agricultural systems he found instances in which no correlation appeared between technology and population density: "Among the Sepik Abelam, to cite only an extreme example, the labour input per tuber planted was fifty to sixty times greater with Dioscorea alata used in ceremonial prestations than with subsistence yams" (Brookfield 1972:36-7; cf. Lea 1964). Empirical evidence therefore leads to the conclusion that labour inputs cannot be simply correlated with a relationship between population size and material technology. Within particular societies people invest varying amounts of effort in different sectors of production. Moreover, some individuals appear to work harder than others, and average per capita labour inputs appear to vary between societies as well. Brookfield attributes these variations in labour input to warying needs for "social production". Unlike production for the subsistence needs of a population, social production "comprises goods produced for the use of others in prestation, ceremony and ritual, and hence having a primarily social purpose" (Brookfield 1972:38). People, it seems, do not work for subsistence needs alone, but for social needs

as well. Chief among social needs are political considerations of power and prestige. No doubt there are complex articulations linking the size of a population to the amount of power and prestige necessary for the maintenance of social order, and hence to the amount of necessary social production, but the point to be taken here is that the development or intensification of the forces of production in a society cannot be simply linked to either population or technology understood apart from the variable of human labour. Production systems and transitions between them over time must be understood in relation to the economies of social integration and political competition, that is, in the terms of political economy. The significance of Brookfield's model of intensification lies in the decomposition of its categories: passive population growth becomes active human labour, output for subsistence becomes production for both subsistence and social needs, and curves of technology become curves of the complex articulation of both material/technological factors and the social relations that people enter into for the production of subsistence and social order.

Interpreting the ethnographic sequence in central New Guinea in this perspective, the significance of horticultural intensification lies not only in its effects on population but in its implications for social order as well. Increased sweet potato production per capita would seem to depend, at least in part, on increased per capita labour. The resulting surplus is used to increase the number of pigs per person. An increased pig population may well have effects on population growth by increasing the amount of animal protein available for consumption. But pigs are good for exchanging as well as for eating, so that pig production becomes simultaneously subsistence and social production. While protein deficiency may be a factor inhibiting the growth of Ok and Hewa populations, there are few signs of protein malnutrition among the Duna: a pig per person ratio of 1 to 1 appears adequate for subsistence needs. Even higher ratios among the Huli, Enga and other peoples to the east therefore suggest that as populations grow their production becomes increasingly dominated by social needs. Among all Highlands populations practising intensive sweet potato cultivation it is evident that pigs are not simply tended until they reach a size suitable for eating, as

141

would be determined by a rationality of consumption. Rather, pigs are accumulated, stock-piled until the accumulator has a number sufficient to engage in prestations bringing power and prestige. Pigs are valued as objects of accumulated wealth with potency in the realm of social relations; their primary use-value as meat is augmented by a second value as objects of social exchange. If there ever was such a thing as an Ipomoean Revolution, in Duna country or elsewhere in the Highlands, then we may suppose that it was a revolution in social relations as well as in production. More, that if transformed social relations are a product of the incorporation of a revolutionary raw material into the then existing production systems of pre-Ipomoean times, then social relations were also a determining factor at the outset. Pre-Ipomoean man may not have guessed what use his descendants would eventually make of the sweet potato, but the outcome of the experiment was in a sense already determined from the moment that people decided to use the sweet potato to increase pig production by working harder.

/5/ Men of Taro

... imagine the thoughts that crowded upon my mind as I sought more of these curious objects. My mind wandered from the present into the depths of time. I pictured the passing of an unknown and populous race, one more advanced in refinement than the Papuans. Their story is to be read only in the relics themselves.

> --- Jack Hides, relating a find of artifacts on the Strickland below the Rentoul, Beyond the Kubea, chapter V.

There remains the archaeological evidence. The Canberra seminar report was among the first announcements of discoveries being made at excavations in the Wahgi Valley near Mt Hagen (Golson *et al.* 1967), Lampert 1967, Allen 1970). Throughout the region there are large areas of ditching suggestive of intensive horticultural practices in nowabandoned swampy ground. Investigations at sites at Kuk and the Manton Plantation resulted in (among other findings) a radiocarbon date of 2300 BP from a digging stick, what appeared to be a canoe prow (undated) sunk in a channel, and a second radiocarbon date of 4600 BP, which was presumed to pre-date horticulture in the area. Whatever else the findings might mean, it was clear that any suggestion of a pre-Ipomoean Highlands occupied by only nomadic hunter/gatherers was no longer tenable.

Further excavations at the Kuk site have revealed a far richer and deeper pre-history of intensification than anyone seems to have imagined during the debate over the Ipomoean Revolution. In one of his most recent publications ("No Room at the Top: Agricultural Intensification in the New Guinea Highlands"), Golson has described a complex sequence of five or six distinct phases of human activity at the Kuk site, beginning some time before the deposition of a wedge of grey clay over the area about 9000 BP. Golson suggests that the clay is due to erosion from garden clearings on the slopes above the site. The earliest archeaological features—a complex of gutters, hollows, shallow basins (pig wallows?), pits and stakeholes, together with a 2 m wide by 1 m deep drainage channel dug across the corner of the excavation area for a distance of about 700 m—are interpreted by Golson as due to the activities of pigs, horticultural practices, or both. An alternative interpretation might be that the site was originally dry enough to be selected as a regular encampment or area of habitation. The drainage channel may have been intended to keep the site comfortable for occupation rather than for any directly horticultural purpose.

/5/

Whatever the interpretation, it appears that horticulture must have begun in the region 4000 years or more before the time suggested by the Bulmers for the beginning of the New Guinea pre-Ipomoean neolithic, perhaps from the time when the climate warmed following the last glaciations (see Hope and Hope, n.d.; Calaby, n.d.; and table, 5:1). What crops might have formed the basis for such an early system? On the Southeast Asian mainland, excavations at Spirit Cave have yielded plant remains-including bottle gourds, cucumbers, and Phaseolus beans, all known in New Guinea and considered to be ancient-datable to the period 12,000 BP to 7600 BP (Gorman 1970). These are either domesticates or their precursors, leading Solheim (1972) to suggest 15,000 BP as the probable date of earliest SE Asian plant domestication. Give or take 5-6,000 years, are the earliest practices at Kuk representative of an indigeneously developed New Guinean horticulture, based on New Guineadomesticated crops such as bananas, sugar cane and greens, and appearing as a full-blown but short-lived era of sedentary horticulture contemporaneous with or shortly after the success of neolithic developments on the northern mainland? Or do they represent a system based at least partly on Asian crops (taro especially), introduced into the Highlands not long after their domestication on the mainland? Were people in the Highlands only waiting for the climate to improve before commencing horticulture? If so, then it seems necessary to suppose that initial New Guinean experiments with plant domestication must have begun at lower elevations during the same period as the earliest neolithic developments in SE Asia. Either that, or the post-Pleistocene appearance of horticulture in the Highlands was a direct consequence of stimulation by SE Asian developments. Perhaps the hunter/gatherer phase in the Highlands, like the pre-Ipomoean horticultural phase in relation to the sweet potato (or the ethnographic present in relation to european.

developments), came to an abrupt end following contacts with (colonization by?) the mainland. Whatever the case, a uniformitarian picture of slow and gradual development over a long period of time seems less than adequate to the data now requiring explanation.

Table 5:1 Chronology of Australasian pre-history. ("There is no history without dates", Levi-Strauss 1962:258).

>`	200,000	BP	man in Java, Philippines, Flores, Timor
37	- 38,000	BP	man in southern Australian (earliest date so far)
*	26,000	BP	Kosipe rockshelter (earliest New Guinea date so far)
str _e	20,000	BP	Australia fully occupied; incipient horticulture in SE Asia?
15	- 9,000	BP	climate warming, glaciers melting, sea levels rising
13	- 8,000	BP	plant and animal domestication and invention of pottery in SE Asia
	9,000	BP	Kuk Phase 1 — pigs present?
8	- 5,000	BP	climate warmer than present
6	- 5,500	BP	Kuk Phase 2 — channels and small beds; rice and bronze in SE Asia
4	- 3,000	BP	rise of early empire of N. Vietnam/S. China?
4	- 2,500	BP	Kuk Phase 3 — true horticultural drainage system; Austronesian expansion out of SE Asia
2	- 1,200	BP	Kuk Phase 4 — swamp re-ditched, then abandoned at time of ash-fall
+-	ca. 700	BP	"men of taro" — Huli genealogical tradition
4	100 - 100	BP	Kuk Phases 5 and 6
	ca. 300	BP	settlement of Tumbudu Valley by sweet potato horticulturalists — Duna genealogical tradition
	250	BP	sweet potato introduced in Wabag-Hagen area? volcanic ash-fall, large area of swamp cultivation
			abandoned at Kuk

er?

Golson's (1977) interpretation of the archaeological evidence at Kuk is highly sophisticatad and relies upon interpolations with both palynological and geomorphological findings. But as the evidence has mounted the potentialities for speculative interpretation have both increased in scope and narrowed in focus. Through archaeological syntheses of the kind attempted by Golson it seems that we are coming closer to an understanding of what really must have happened in the past, while at the same time increasingly detailed knowledge from an increasing range of data bases threatens to overwhelm our capacities for synthesis. Golson has apparently changed directions several times in the course of his own thinking about Kuk. The major problems have to do with the delineation of the phases and their interpretation as a meaningful sequence of stages in the development of pre-historic subsistence systems.

79.

Golson thinks that Phase 1 was shortlived, although the clay deposition from erosion continued forming for about 3000 years. Then a second phase appears in which new drainage channels are created and cultivation is definitely carried out in the flatlands. This phase too seems shortlived. Phase 3 begins about 500 years later with a more developed drainage system (suggesting perhaps a rise in the water-table). This phase continues for roughly 1,500 years and comes to a close with soil aggregates clogging the drains. Golson's interpretation is that the practice of complete tillage of the soil has been introduced into the hillside gardens, thereby increasing productivity and alleviating the need for the labour-intensive drainage system.

After a hiatus of perhaps 500 years, the swamp is once again reditched—suggesting that the technological innovation of soil tillage was insufficient to permanently reduce pressure on land resources. This drainage system continues in operation for around 800 years until its abrupt abandonment *ca*. 1200 BP. Curiously, the end of Phase 4 coincides with a fall-out of volcanic ash, the debris of which lie almost in the bottom of the channels, which then are filled with sediments from the surrounding hillsides above the swamp site. Pollen diagrams for this time reveal a relative decline in the forest component and an increase in *Casurina* and *Trema* pollens, characteristic of disturbed

/5/

woodlands and suggesting the deliberate practice of tree-fallowing in the hillside gardens. Elsewhere (Golson 1976 and other references cited 1977, p. 627) Golson has interpreted these findings by arguing for the arrival of the sweet potato at this early date. The drainage system is not renewed for 800 years following the ash fall, suggesting that some change (sweet potato plus the tree-fallowing system?) has reduced pressure on land resources and allowed cultivation sufficient to the needs of the population to be carried out entirely in the hillside areas. But in his 1977 paper Golson is more cautious on this point. He suggests instead that tree-fallowing alone might be sufficient to account for this abandonment of the swamp cultivation system.

Golson's notion that an early arrival of sweet potato at 1200 BP could account for the abandonment of cultivation in the swamps is attractive, if for no other reason than that some explanation for the 800 year hiatus is necessary. It is also an audacious notion, one that goes against the weight of current botanical and historical opinion. If the sweet potato did arrive in central New Guinea ca. 1200 years ago, it cannot have come via Portuguese navigation, the usual explanation for the transportation of the crop from the New World to Africa and thence to the Philippines and New Guinea. It seems necessary to postulate Heyerdahl-like contacts by pre-Colombian peoples either across the Pacific or between the New World and Africa. This is not out of the question, but it must remain highly speculative until botanical evidence can be adduced in support. Consideration of these problems may have led Golson to his more cautious re-interpretation.

Moreover, by postulating an early date for the arrival of the sweet potato, Golson seems to have created another problem in his interpretation. Phase 5 at Kuk begins *ca.* 400 BP with a new system of extensive and elaborate ditches, gridded fields and drainage channels. A second layer of ash-fall, dated *ca.* 250 BP (Blong 1975), marks a shift in the character of the system and contraction of the area under cultivation, leading finally to complete abandonment at some time before the memory of living informants, presumably about 100 years ago. This second ash-fall and contraction of drainage cultivations coincides with 15/

an increase in forest clearance indicated in the pollen diagrams as beginning around 260 BP (Flenley 1967), which can easily be taken as a consequence of sweet potato cultivation. The problem, unstated by Golson, would seem to be that if the sweet potato arrived in 1200 BP, then no explanation remains for the contraction of swamp cultivation and increase in hillside and high altitude forest clearance beginning ca. 250 BP. The mechanism of explanation suggested is the same for both the abandonment of the entire system in 1200 BP and for its contraction in 250 BP-a new crop adaptable to a wider variety of conditions with increased productivity. But as an explanation, the mechanism can only be used once. As it is, even if the date of 250 BP is accepted for the initial arrival of the sweet potato, there is still the problem of the total abandonment of the swamp system about 100 years ago. Golson's interpretation suggests that the last period before final abandonment was a period of early Ipomoean experimentation during which swamp cultivation techniques were evolved into the present-day Hagen techniques of dry land cultivation in raised and ditched beds. As new cultivation techniques were developed the swamp cultivations were phased out because of the excessive labour required for the up-keep of the drainage system. This seems plausible enough, but reinforces the 250 BP date for the earliest arrival of the sweet potato.

The richness of the Wahgi Valley findings are perhaps now presenting an embarrassment for archaeological interpretation. While the initial discoveries demonstrated the existence of intensive horticultural systems before the presumed arrival of the sweet potato, and thus supported gradualistic, evolutionary interpretations against revolutionary notions, subsequent findings may be extending the earliest period of horticulture back into time too far for any gradualistic explanation of the neolithic revolution. New difficulties for interpretation are also emerging at the other end of the time-scale. The drainage works of Golson's Phase 5 are visible from the air, and similar features are revealed by aerial photography to be widespread through the upper Wahgi region. Golson seems to have supposed at first that these extensive drainage systems were of very recent origin, (perhaps the accompanyment of an early stage of expansionary sweet potato cultivation?) But further

evidence suggests that much of the Phase 5 system may date from the beginning of the period, 400 or 500 years ago. If the sweet potato did not arrive until 250 BP, *i.e.* the time of the second ash-fall and the contraction of swamp cultivation, then (reasons Golson) the earlier part of Phase 5 must have served taro and perhaps yam cultivation. It is one thing to suppose that limited areas of intensive taro cultivation existed in the Highlands prior to sweet potato horticulture, but to suppose that large areas of swamp country were utilized for intensive taro cultivations, and then completely abandoned following the arrival of the sweet potato, smacks somewhat of notions of "radical and recent change".

The implications, however, are the opposite of those originally suggested by Watson. Instead of suggesting small, nomadic populations recently converted into large, sedentary populations by the introduction of the sweet potato, the conclusion would now seem to be that the sweet potato brought about a radical de-intensification of a wide-spread system of intensive taro cultivation. Populations which were presumably concentrated about the intensively drained and cultivated areas were suddenly "decompressed" by the relief of systemic pressures. The resulting dispersal of settlement and increased time free from the work of maintaining drainage channels suggests consequences for social organisation as radical as those envisioned by Watson. Golson does not pursue these possibilities, however, although his concluding remarks (1977:632) imply that the adoption of sweet potato cultivation is now to be seen____ as a fundamental event rather than the relatively inconsequential nonevent proposed by the Canberra group: "The highlands are still adjusting to the potential-and limitations-of the recently adopted staple".

Critique and speculation

From the perspective developed in preceding sections, several reservations are suggested in respect of Golson's interpretation. His basic explanatory hypothesis is that as horticulture has developed in the area, eco-systemic pressures have built up which have forced the laborious

15/

151

reclamation of swamp land. Whether these pressures were due more to increased population or to environmental degradation is not specified. Whatever the cause, a series of innovations-both new cultivation techniques and the new crop, the sweet potato-have intervened at various points in the process to provide "room at the top", that is, renewed cultivation potential for the surrounding hillsides and hence easing of pressures for swamp reclamation. The sequence of phases of development and abandonment of intensive cultivations are then interpreted in relation to a postulated inter-play of developing pressures and technological innovations which release pressure. Two aspects of this interpretation are reminiscent of the Boserupian reasoning of the Canberra group: the build up of pressures appears to operate as an autonomous mechanism gradually forcing people to adopt technological innovations, and the development of intensive techniques in the swamps appears only as a response to these pressures. At no point does Golson consider the possibility that the evidence might suggest a more varied and indeterminate course of societal and production-system development. For example, Golson attributes the end of Phase 3 (the longest period of continuous cultivation in the swamp) to the adoption of soil tillage as a technique in the surrounding hillside gardens. But the soil aggregates which thereafter fill and block the channels of the swamp drainage system may be a sign of disaster rather than success. It could be that the swamp system-far from being no longer necessary-became impossible to maintain due to increased soil erosion from over-exploited hillside garden-lands. It could be that the entire Kuk area was abandoned, and only recultivated after 500 years of forest regeneration.

Golson's unconcern with the curious relationship between ash fallouts and swamp cultivation is also perhaps indicative of a gradualistic and uniformitarian bias in his interpretation. In his perspective the ash-falls appear as non-events, of interest only as an aid to dating the stratigraphy. But in the perspective of contemporary Highlanders who know of these events as a part of their ancestral history, the ash-falls take on a more dramatic character (cf. Brookfield 1961, Watson 1963, Glasse 1963). Duna traditions portray these events as periods of considerable danger, and both practical and ritual precautions are enjoined

by the ancestors to prevent disaster should the mod ("silt" or "sand") come again. People must stockpile their houses with food and water and stay inside. Roof beams must be reinforced least the weight of the mo. crush the houses. When the fall-out stops, people must remain indoors an additional day in respect of each of their same-sex siblings: a man with four brothers must stay inside four days and so forth. Failure to observe this rule may result in death. When people at last emerge, the ancestors have instructed that the crops must first be uncovered before they die. Water supplies may be choked with the silt and famines may occur, but eventually the rain will wash the mö into the ground and an era of renewed soil fertility will follow. Glasse (1965) reports that some Huli have performed rituals in an effort to bring on another fall-out. My Duna informants said that although they believed that their gardens and the people as well would finally succumb to the effects of declining soil fertility, they would never contemplate such a dangerous and drastic solution. No doubt the real effects of ash-falls have been over-dramatized in the course of oral transmission, but perhaps current beliefs reveal something of the past consequences of these events. The ash-fall of 1200 BP might have been disastrous for the Wahgi Valley people; perhaps ashes initially blocked the drainage system and killed much of the crop. Perhaps the entire area was abandoned, hillsides as well as swamp. Alternatively, renewed fertility following fall-out (as reported by the Duna and Huli) might have played a real role in changing the course of horticultural development. Perhaps crop productivity was so improved that people allowed large parts of their production system to fall into disuse.¹ In offering these suggestions I am advancing catastrophism as an interpretive principle against gradualism. Golson, no doubt, has Occam's Razor on his side in assuming a single and uncomplicated direction to systemic evolution. The question is whether the principle of parsimony is the best guide to understanding history.

Golson also assumes that swamp cultivation was basically a labourintensive form of land reclamation, such that it was only resorted to during periods when hillside cultivations were insufficient to the needs of the population. Implicitly, intensive methods of cultivation are

54. I

assumed to yield less per unit of labour input than hillside cultivations. This assumption requires critical examination. Pospisil (1963a), for example, reports that the Kapauku invest 200 hours and 15 minutes labour on average to produce 1,150 kg of taro from a 900 m² area of flat-land. This equals 5.7 kg per hour. In contrast, 187 hours and 30 minutes are invested to produce 730 kg of sweet potato by shifting cultivation in hillside plots. This equals 3.9 kg per hour. Kapauku taro cultivation in the flat-lands is therefore more efficient than hillside cultivation of sweet potato, and this despite the general assumption that sweet potato produces more per unit area than taro. Contrary to Golson's assumptions, it may then be the case that the swamp cultivation phases at Kuk represent periods in which increased absolute amounts of labour were invested to create systems offering improved ratios of productive efficiency. Instead of "no room at the top", the sequence of activities at Kuk and in the surrounding hillsides could perhaps be reinterpreted as a case of "not enough room at the bottom".

Unfortunately for the problems of archaeological interpretation, little agronomic data on systems of taro cultivation seems available. Clarke (1973) provides yield estimates for taro gardens in the Jimi Valley and Mt Hagen areas. His findings refer to shifting cultivations under forest and Miscanthus fallow, and are in striking contrast to Pospisil's data from flat-land gardens. From Clarke's observations there seems little doubt that shifting taro cultivations require more labour than sweet potato cultivation, take longer to mature, and yield only 10% to 30% the weight per unit area of sweet potato.² Perhaps even more significantly, taro requires good soil and cannot be successively cropped in forest gardens without reduced yields. In line with this observation, Clarke suggests (following Brass 1941) that the practice of ditching in swamp-land gardens may not be so much for drainage as it is for fertilization of successive plantings with spoil from drainchannels (cf. Golson 1977:629). In relation to Pospisil's data this speculation appears to me crucial, since it suggests that far from being a laborious and hence inferior form of cultivation by comparison with hillside gardens, the swamp cultivation system may have developed as a highly efficient system of intensive permanent cultivation. The drainage

systems may have required great labour to create, but once established the effort required for maintenance might have been considerably less than that involved in continuously shifting cultivation. Moreover, the swamp system would seem to offer much higher yields of taro per unit area, as well as the possibility of more or less permanent cultivation within a fixed locality. In short, the possible advantages of a ditched and sub-soiled system of taro horticulture might make the difference between an immediately pre-Ipomoean population of Baktaman character and a large population of sedentary cultivators, perhaps residing in permanent villages.

The sociological implications of such possibilities are considerable. Imagine by contrast with the small, shifting nucleated settlement of the Baktaman a fixed village of perhaps 600 or more people. The problems of social order and hence the resulting social organization would be entirely different (see Tuzin 1974 for an example of social control mechanisms in a Sepik village with a population of a thousand). Not only would the problems of internal order be acute, but such a village would in likelihood be confronted by other villages of a similar order wherever suitable swamp-lands allowed their growth. Since the swamp drainage and cultivation systems would have required large amounts of labour in their establishment (but, I suggest, little labour for their continued operation), it seems likely that wars of territorial conquest could have occurred between villages. Moreover, there seems no reason not to suppose the simultaneous existence of semi-nomadic, Baktaman-like bands in the mountains surrounding the populous swampy areas. These bands, too, may have attempted to displace the villagers and take possession of the fixed cultivation system, Or, an alternative possibility, perhaps they were numerically too weak to pose a serious threat and existed instead in a state of complementary symbiosis with the villagers (see Hutterer 1976 for a similar proposal in SE Asian prehistory).

A similar juxtaposition of small Bands practicing extensive shifting cultivation and large groups with intensive swamp cultivations may have existed in the Duna and Huli areas in pre-Ipomoean times. Huli

151

traditions distinguish between the "men of taro" who initially occupied the Tari Basin some twenty-five generations ago, and the "men of sweet potato" who date from the last ten or so generations. The distinction is not made in the Tumbudu Valley, but parish histories here place the earliest settlement from nine to fifteen generations ago. In the adjacent Lake Kopiago Basin, however, a local story relates that at one time (genealogically not specified) many people lived where now there is only lake and Phragmites swamp. A man who was going to Enga country on a salt-trading expedition admonished his son not to uproot an exceptionally large taro plant in the garden. But while the father was away the boy yielded to temptation and a flood of water issued from the ground as he pulled up the taro. The father returned and attempted to divert the flood by digging drainage ditches, but to no avail. Lake Kopiago was formed and his son and the other people drowned. From the air a complex of ditches is readily visible today covering an area of 30 km² or more in back of Lake Kopiago (see Blucher Range aerial photography run 17E, SB54-7). Some of these ditches are still maintained, draining excess water from sweet potato cultivations about the margins of the present swamp. Clarke (p.c.) has suggested that the remainder of the system may not be of any great antiquity-but similar assumptions by Golson turned out to be wrong in the case of the Wahgi Valley ditching. Still, even if one were to give credence to the local tradition, it must be admitted that apart from the incident of the uprooted taro there is nothing to suggest that the ditching is pre-Ipomoean. My informants said that they did not know if the earliest people lacked sweet potato: "we do not think about the origin of sweet potato; our ancestors ate it and we have followed them".

But the lack of evidence at present does not alter the theoretical significance of the possibility. As I have argued, the gap between the low intensity, taro based societies of the ethnographic sequence and the high intensity, sweet potato-based systems cannot be bridged by the introduction of the sweet potato alone. For a transformation of production systems to have taken place, new relations of production were required in addition to new materials. People had to choose to work harder in order to produce more. Within the range of examples provided by the ethnographic sequence it does not seem possible to locate a point at which these new productive relations emerged. But if in pre-Ipomoean times there were communities in the region unlike any of those in the ethnographic sequence, communities erected on the basis of high-intensity taro cultivation in swamp-lands, then a new set of possibilities emerge for understanding the course of intensification.

/5/

As a speculation, I would suggest that it was in compacted, populous communities practicing intensive swamp-land cultivation of taro that the relations of production which made the Ipomoean revolution possible were first forged. The basis of this development would have been the initial elaboration of forms of labour, surplus to subsistence needs and utilizable for the production of forms of wealth suitable for social exchange. If, as I have suggested, the maintenance of systems of intensive taro cultivation required little labour and offered high ratios of productive efficiency, then it is not difficult to understand where the surplus labour originated from for the production of social wealth. The increasing efficiency of subsistence production would have provided the spare time, so long as food production was not out-paced by population growth. It seems more of a difficulty to glimpse what the product of the surplus labour was, and how it would have been incorporated into systems of social relations to create political stability and maintain order while populations increased.

It is possible that, then as now, the social product of surplus labour was pigs. Certainly, communities of intensive taro cultivators must have had more pigs than, say, the Baktaman. But superior hunting resources in those times would have made pigs less valuable as meat, and this would have depressed their social exchange value. Moreover, it is possible that a large pig population cannot be readily maintained on taro; certainly it seems that pigs themselves much prefer sweet potato (Steadman, p.c.). In any case, with limited areas of swamp-land available, pre-Ipomoean populations could not have expanded their pig herds without cutting into their own fixed level of food production. (Only the innovation of high intensity sweet potato production in hillside gardens could eliminate this basic constraint on pig production). To conclude my speculations on the possible existence of high production
pre-Ipomoean societies, I therefore offer an even more speculative suggestion: that the basis of pre-Ipomoean social production was the creation of labour-intensive, durable artifacts, ritual objects and/or works of art.

Stone mortars and pestles, figurines, club-heads and other objects of pecked and polished stone have been widely reported in the Highlands and from elsewhere in Melanesia (see among other sources Bulmer and Bulmer 1962 & 1964, Höltker 1951, Pretty 1965, Schmitz 1966, Seligman and Joyce 1907, Wirz 1951). Apart from a few examples of the manufacture and use of clubheads and mortars in the ethnographic present (Austen 1923, Davidson cited in Pretty 1965, Chappell 1964, Williams 1930), these objects are generally of unknown provenance and uncertain purpose. Present-day peoples are mostly ignorant of their manufacture and even fail to recognize them as artifacts. They are often regarded as magical objects obtained from the ancestors or actually embodying the ancestor or his power (e.g. Meggitt 1965; Williams 1936, chapter 7). They have been of continuing interest to anthropologists, culture historians and others, both because they seem to be relics from an era more technologically advanced or elaborated than today, and because they offer clues to possible migrations of peoples in the past (e.g. Bühler 1946/49, Haddon 1920, Riesenfeld 1950, Speiser 1946). Most specimens have been obtained directly from local people, who find them while gardening and/or keep them as magical or cult objects. It seems that there are no examples known from archaeologically datable contexts, and it is not even certain that all these objects belong to a single complex. However, stylistic features of some club-heads and mortars, as well as of certain flaked stone axe blades and ground stone spearpoints, are suggestive of bronze prototypes. At least part of the complex would then date from contact with or occupation by SE Asian peoples with metallurgical technologies, probably no earlier than 5000 BP.

In Duna country these mysterious objects are known as *auwi*, magical power objects, and are not recognized as artifacts or indeed even as stones. Depending on their form they are identified as the bones or fossilized bodily organs of ancestors or of non-human giants or

monsters, or as excrement or rubbish cast down by the Sun. The most common auxi are polished spheroids of dense, black sedementary stone, from 6 to 11 cm in diameter. These are identified as anoa hungunuma, "men's hearts", and are regarded as the soul receptacles of known ancestors of four to eight generations ago, whose genealogical position can be traced in relation to living men. Smaller spheroids are tsiri dewa, "fairy kidneys", and elongated ones are auwi yokonia, "intestines". While many of these could conceivably be naturally formed objects, their state of polish, hammer-marks, evidently bored pits and holes, as well as certain examples with deep tubular cavities of irregular square crosssection, all suggest human modification. Less common are cylindrical and conical pestles, known as dama kara, "spirits' penises". A few large, undecorated mortars have been found in the area and are regarded as hewa tsangi, "hats of the Sun", while fragments of stone dishes and balls of volcanic stone are "Sun shit". Club-heads and human representations seem to be unknown, although I have seen examples of both in Huli Duna informants have also described to me certain specimens country. which might have been figurines of birds; they were central objects in secret parish cults and have been destroyed or hidden since mission activities began in Duna country.

90.

Despite suggestions of practical uses for mortars and pestles (e.g. Bulmer & Bulmer 1964; R. Bulmer 1964) for grinding nuts and seeds or mashing taro, the shallowness of most mortar holes and their external ornamentations, as well as the elaboration of pestle-handles surmounted by figures of birds, suggests that non-utilitarian considerations may have been uppermost in their manufacture. Like pigs, some of these objects may have combined a primary use-value with a further value as purely social productions, but unlike pigs their social value as objects of ritual or exchange appears to predominate over any possible use-value. Certainly these objects must have required large investments of labourtime, and their value as social productions would have been related to the amount of labour materialized in their creation.

The question is often raised why these forms of elaborated technology have been given up or lost. In terms of the present perspective

151

/5/

an answer can be suggested: labour-intensive stone-work was produced in the pre-Ipomoean period by communities with highly efficient food production systems as an investment of surplus labour in the creation of socially valuable wealth-objects. The advent of the sweet potato made it possible to invest surplus labour in pig production rather than stonework, and this offered the advantage that the product had an increased use-value as well as a social value. (Declining wild animal resources may also have played a role in this development). I would suggest that whenever human populations have time free from immediate subsistence needs and lack the means of increasing the sum-total of their use-values above what can be consumed within their political communities, they devote their energies instead to social production aimed at consolidating or extending their realm of political or ritual order. Social production may be the production of food for exchange (consider the case of the labour-intensive ceremonial yam in the Sepik-Tuzin 1972), but it may also be the production of works of art, of ritual paraphernalia and of rituals themselves. Where useful surplus food cannot be produced in a given environment with available technologies, human energies will be diverted into non-utilitarian productions. Thus, I would propose that the mortar and pestle complex be seen by analogy with the elaborate wood-carvings and ornately embellished items of functional equipment so often found among advanced or "mesolithic" peoples with sedentary modes of hunter/gatherer food production. The riverine communities of the Sepik, the Asmat of West New Guinea, and the salmon-fishing Indians of the American Northwest Coast, as well as the Magdalenian period of european pre-history, might be taken as possible comparisons. Why these peoples elaborated their social productions chiefly in materials of wood and bone rather than stone I leave as an unresolved question. In all instances where a social production of art and ritual with little direct use-value appears, it may be that we are dealing with cases where an enlargement of the realm of social order cannot be effectively pursued through the production of utilitarian goods. An "involutional" development, the social production of ritual and ritual goods, then appears.

A final observation seems consistent with this interpretation. Figurines of birds, among the most striking of the stone-works of the mortar and pestle complex, are characteristic of Melanesia and apparently not known outside the area (Bulmer and Bulmer 1962, Höltker 1951, Pretty 1964a). The notion of the human soul as a bird is likewise widely distributed in Melanesia (e.g. Gardner 1963, Heider 1970:69, 218, 235; Wagner 1967:40; and section /6/, below, for Duna notions), as seems not inappropriate in a land where bird-life is prominent and bird plumes are widely sought after as essential means of self-expression through body ornamentation (cf. Strathern and Strathern 1968 & 1971). As I shall argue later in the thesis, social production comes to have efficacy within the realm of social relations by taking on the appearance of a substitute for the production of humans themselves. Pigs, for example, are exchanged by the Duna as equivalents of human life - in bride-prices and in compensation payments (damba) as blood-money in substitution for revenge and further killing. Mythic allusions and everyday sayings also suggest that on the level of associational logic, Duna see pigs as social productions substitutable for humans. By substituting pigs for humans, Duna are able to engage in social transactions that would otherwise be impossible for them; they are able to extend their realm of social order. But if the notion of equivalent substitutability is a necessary condition for the development of socially efficacious production, then it would be expectable that non-utilitarian productions should in some way actually resemble the humans they must replace. Representations of ancestral or totemic figures are commonplace among advanced ("mesolithic") peoples without horticulture, and are perhaps but particular instances of a more general strategy of representing human equivalence through portrayal of the conceived of image of the human soul. Perhaps pre-Ipomoean peoples in the Highlands conceived of their souls as birds, in the same image which still has some currency among peoples of the ethnographic present? Perhaps before the economic production of pigs for social exchange in the post-Ipomoean period could become a reality, it was necessary for people to experiment with an earlier and more directly symbolic form of ritual production. Such an experimentation would have amounted to a "domestication" of the phantom of # expended surplus labour into a congealed and durable representation of man's own self in the image of his dreamed-of alter, the bird/soul.

92.

/5/

Much more archaeological work will have to be done before we can really hope to understand how intensification has come about in New Guinea. Perhaps there are flat-land sites at lower elevations than those in the Highlands which may yield important discoveries. So far as my speculations relating the mortar and pestle complex to high effiency systems of intensive taro cultivation are concerned, some archaeological evidence of association or at least datable finds of these stone artifacts would seem to be essential (see Pretty 1964b). Whatever the findings, however, it is my suggestion here that further interpretation should move away from gradualistic and uniformitarian assumptions, that the data of pre-history, like the data of the ethnographic present, must be seen in relation to the active creation of social relations by human beings conceived of as something more than the passive victims of autonomous forces (cf. Childe 1936 & 1951).

/5/

93.

Part Two:

FACTORS OF PRODUCTION/FORCES OF PRODUCTION

People require a constantly renewed source of consumers' products. In order to get them, it is necessary to organize certain elements of the environment and the society, which economists call the factors of production. These factors include, among others, people and their work, land and its fertility, ingenuity and its motivation, and capital and its ownership.

- Paul Bohhanan, Social Anthropology, p.228.

He confronts nature as one of her own forces, setting in motion arms and legs, head and hands, in order to appropriate nature's productions in a form suitable to his own wants. By thus acting on the external world and changing it, he at the same time changes his own nature. He develops the potentialities that slumber within him ...

- Marx, Capital I, ch. 5, part 1.

/6/ Dindi ("Ground")

"Dindi is the tse [origin] of everything. Everything comes up from the ground: trees, pandanus, taro, sweet potato, men and pigs as well. Good ground has grease in it [dindi-nguani bele]. We plant all our food here: sweet potato, bananas, taro, sugar-cane, greens ... Everything grows well and we eat it. People and pigs thrive and more people come up. Ground that's not good, it's boggy or something, pigs can go there and find grubs and bugs to eat. Red ground isn't good. We leave it for the forest to grow. Later on we can make gardens there".

- Paliawi of Horaile', February 1972.

"You and the other academic [sabemasta] have been looking at sweet potato mounds and earth banks all morning. I've been thinking a lot about this. Everything has an origin, but what's the origin of the ground?"

- Irari of Horaile'.

As in most primitive societies, land in Duna country enters no market as a commodity to be sold or exchanged. As a factor of production it is conceptualized primarily in terms of its intimate association with social groups delineated by kinship. People do not live together because of their prior individual relationships to adjacent parcels of land, but rather the land has a territorial organization because groups of people live together. But unlike the classical African examples of kinship-based land tenure, Duna do not conceptualize the spatial organization of their country directly in terms of geneologies (Evans-Pritchard 1940; Bohannan 1963; Sahlins 1961; cf. Barnes 1962). Rather, they conceptualize both geneology) and land in terms of a partpractical, part-mystical idiomor image: a tree, with its roots springing from the ground, in an intimate yet not entirely unmysterious association with the soil. This theme, this Duna way of thinking the relationship between land and people, will be encountered again.

In the more populous and productive areas of New Guinea's Highlands, social processes are played out against the constant backgroundnecessity of maintaining territorial integrity, while at the same time producing enough to maintain a group sufficient to the tasks of defence (cf. Meggitt 1959; Brookfield and Brown 1963). In Duna country however men do not think of their land as a scarce resource to be defended against conquest; nor do they need rigorous controls to regulate admission to their kinship groups (and hence access to land) by criteria of unilineal descent. As Duna say, "We don't know about fighting over land". And as they recognize, humans and pigs are the real scarce values in thier system, not land: "there's plenty of land, we're short of men".

2.

Hence Duna are unaccustomed to thinking of land as an ingredient in their social formation separable and distinct from their genealogically based social organization. They have little experience, unlike other Highlanders, of kin-groups uprooted and alienated from their land by warfare. They are easily able to operate a cognatic descent system in which all the descendants of a parish founder, traced through any combination of male and female links, can be granted rights in the land of the group, regardless of whether or not they reside on the land. This double absence, the lack of alienation from land through war, and the lack of alienation from kinsmen through strict unilineal descent principles, may contribute to their acceptance of a mystical fusion of kinship and land in the single image of a tree, its base and roots in the ground from which it springs.

Before outside contacts widened their conceptions of geography and the cosmos, Duna thought of their world as a land of mountains contained within a counter-clockwise spiral of rivers. The main rivers of Duna country flow northwesterly and then, joining the Lagaip and the Strickland (called *Aiwe*) turn back to the south, forming the first sweep of the supposed spiral. The origins of the river system, in the headwaters along the low divide between Duna and Huli country, are referred to as *iba tse* ("water origin/base") or *iba kuni* ("water head").² As with a tree, as one moves along the rivers from their bases one encounters "branches"(*iba haiyu*, cf. *dowa haiyu*, "tree branch").³ At the edge of the world the spiral of rivers joins the sky, which is itself an inverted land of mountains (*karia yuniyu*, "mountain blue-sky"), thence flowing into the sky to fall again as rain

96.

upon the land below. Some Duna have heard stories about people in the sky, and it is said that the smoke and steam from the fires and earthovens of the sky-people form the clouds which hide their houses and gardens from view below. But beliefs about sky-people are of little importance to the Duna. No heavenly mirror-image of human society is postulated by them as it is by the Enga living a hundred kilometers to the east (Meggitt 1965). At the point where the earthly river(s) meet the sky it is said that a man with a long white beard keeps the waters flowing by clearing log-jams with a ceremonial killing-pick (ayu ndogoba). Nowadays he is identified with St Peter. At the centre of the spiral of earthly mountains and rivers, somewhere in Huli country, a mythical tree called "Undustale" is said to rise to the sky. Some men say that Undustale is a celestial tree, with its roots in the sky-world and its branches spread out on earth. In either case, myths relate that it was in the base of the Undustale that an impertinent boy embedded the piece of flint which cut open the first woman's vagina. People also say that the dream-souls of men and women who are entering into marriage flit about as birds in the branches of the Undstale Tree.

97.

/6/

Within this view of the land and its place in the cosmos, Duna mythology locates some sixty tracts of land as the parish territories and estates of the major descent groups or descent group congeries.

Some myths relate how parish founders demarcated their territories in the earliest times of human settlement by blazing trees or magically erecting stone dividing-walls. One myth relates how a dog ran about the watercourses marking the perimeter of Malane (or Pongoraia) parish, creating the parish boundaries (*dindi alo*, "ground mark") and bestowing the delimited territory to his human master. Other myths refer to the activities of the ancestors in creating centre points rather than boundaries, or in transferring symbolic mementos of earlier ancestral places beyond Duna country to their present locations. One myth relates how originally all peoples lived in the Strickland, until "a man in the sky" gave each group a distinctive language and a distinctive variety of nut pandanus to carry with it in the subsequent diaspora. The origin myth of Porini parish relates how the mother's brother of Awakolari brought with him from Huli country a branchlet of anga haku pandanus and a lakape tard to plant in the new country. Roro of Puyana likewise takes a branchlet of anga mö, representing his inheritance from his father, when he leaves his brothers to found a new parish on the fringe of Huli country. In the origin myth of Horailenda the original cassowary-ancestor brings with him from Oksapmin country a magical marita pandanus fortelling men's fates, as well as a leaf-wrapped packet of soil which he spread over the ground at Horaile' to impart fertility from the ancestral country. In a similar way, many of the ancestors brought with them auwi, stone relics believed to be repositories of the ancestral soul-power upon which men ultimately depend for their continued health and the continued fertility of the soil. Other ancestors themselves became auwi, through a

98.

16/

spontaneous process which is believed to slowly transform the hearts and souls of all men into petrified stone balls. Auwi are kept where the ancestor first left them, or at the point where they spring from the soil of the parish as an ancestral soul, usually the site of the ancestor's house. These places become shrines, symbolically representing the *tse* (both origin and root-like continuing base) of the ground and its people.

It is through knowledge of the myths and genealogies connecting living men to the ancestors, ancestral territories and *auwi* that men validate their most general claims to rights in the land. As Malinowski stressed, myths function as charters for human institutions, and in this case it is the mythic and symbolic connection between men and the land, represented in the image of trees, pandanus, taro and *auwi*, that provides the ideological underpinning for ownership and control of land, both as a site for human activities and as a productive resource.

However, myths do not unambiguously divide up all of Duna country in any precise fashion, and many boundaries — particularly where they do not follow watercourses — are considered the common ground of adjacent parishes. Since most of the men who reside in these areas trace descent to the parish founders of both parishes there is

seldom any difficulty. Occasionally, the movements of people and demographic fluctuations result in the occupants of such an area recognizing stronger ties with one parish than another. Then other members of their parish may move into the area and create a de facto annexation, notwithstanding their lack of strong descent connections with the other side. Thus men at Horaile' claimed the adjacent bank of the Tumbudu on the Mbarainda parish side of the river as "Horailenda dindi", pointing out that few Mbarai' men had ever lived there, while the house sites and trees planted by Horaile' men of the past were clearly visible. I could discover no instance in which such annexation led to a fight between parishes. In one recent case the men of Horaile', Kunai' and Naua' all tried to disclaim ancestral ownership of an area of land at the intersection of their common boundaries, since each group feared that ownership would entail responsibility to the Administration for road building in the area.

It sometimes happens that a group of men find themselves living in an enclave within the parish territory of a group where they have no rights by descent. They can obtain provisional rights to reside and cultivate through marriages with women of the place, or by ties of friendship and non-descent kinship. But it is also possible to "buy" a block of land through secular contract and payment of pigs, thereby permanently alienating the land from its ancestral owners. For example, a branch of Mone damene (ambilineage) of Haiyuwi parish living at Horailenda purchased a block of land from the Horaile' men some generations ago. Since that time the men of Mone have become accepted as de facto members of Horaile' who can garden and build their houses anywhere in Horaile' territory. No one today can remember the precise location of the original alienated land within the parish territory. In another instance, the men of Haiyuwi parish purchased a tract of land along their common boundary with Aluni'. Informants said that the. Haiyuwi men had occupied nearly all of their original ancestral territory and had purchased the block to assure their descendants of an adequate inheritance. But subsequently the men living on the block had as many descent connections to Aluni' as to Haiyuwi', so that there was a general uncertainty as to which parish the block of land belonged.

/6/

In instances where a block of land is alienated from one parish group to another it is always the agnates (anoaga'ro, "man-put") of the parish who are supposed to make final decisions concerning boundaries and the number of pigs to be accepted in payment. This is one of the few clear instances of agnatic bias (not just male bias) in the Duna cognatic system. In the Duna view it is entirely justified by general principles of temporal priority and the transmission of parish traditions and knowledge. As one man explained:

100.

"Before, you and I weren't here; our mothers or our fathers came from somewhere else. The anoaga'ro were here first, and their children have grown up from them. They are the origin of the place. We call them dindi tse ("ground base") or dindi aua ("ground owner"). The imaga'ro and imaga'ro tseni (non-agnatic cognates, lit. "women-put" and "womanput base-kind") have come behind them and grown up on top. They can stay here too and then there will be many men, but the anoaga'ro are the ground owners and there are only a few of them".

Although the agnates of a parish are believed to represent the original founder-owners of the land, their right to have the last say in matters of land alienation is understood to derive as much from their knowledge of parish history as from any automatic jural principle of superior rights for agnates. Since most men follow their fathers in residence, while women usually marry out of their local groups and garden where they have only provisional rights by marriage, Duna assume that the agnates of a parish will be more likely than non-agnates to know its history of past settlement and cultivation; their decisions regarding the proprieties of alienation are less likely to be in error.

Several categories of land are recognized by the Duna. *Hii* (a word which also means "outside") is forest land, land which is external to the sites of human habitation and has no past history of cultivation. *Dindi andala*, "house ground", can refer to anything from a small clearing for a homestead in the forest to large areas of garden-land, regrowth scrub and current and former homestead sites, such as those comprising the entire upper river valleys below the limits of cultivation. Gardens are *mbou* and fallow plots left for trees to grow again are *mbou yango*. Large areas of kunai grassland, either in formerly cultivated areas where forest regrowth has been lost

or in frost pockets high in the mountains, are called pou. The swampy flatlands of Lake Kopiago basin and some river flats are hongo tsola Pou-lands are of no value except for the birds and other game pou. that can be hunted there. Forest land has value both for the game and . other forest resources that can be hunted/gathered and as an object of labour which men can transform into productive gardens. Garden land, even when it has lapsed into non-productive fallow, represents a value to Duna since they recognize that past labour has been embodied "My work is [stands] there", a man says of his yango. A yango in it. plot of scrub regrowth can be made into a productive garden with less effort than a new plot can be cleared in primary forest. Although some Horailenda men comment unfavourably on the productivity of fallowed soils in the upper valey (which now support little more than a swordgrass disclimax), in a general sense Duna consider open, cleared country to be preferable to forest. They disparage marginal peoples like the Bogaia and Hewa who "live out in the bush where there are more trees than men" and express pleasure in the density of their own population and the open vistas unobstructed by dense forests in their country. Since there is still plenty of forest (except in parts of the upper valleys) they tend to see the clearing of forest for gardens as a good thing, as an investment of human labour on the side of civilization.4

These considerations lead to the recognition of different forms of rights over land and its resources, according to the category of land involved.⁵ *Pou* lands, being of little value, are in some areas not even claimed by parish descent groups. The vast grasslands of the Strickland and the frost pockets of the Müller Range are outside of all parish boundaries. Anyone can go there to hunt. Forest lands are almost all claimed by one parish or another. To hunt, gather, or clear a garden a man must be a recognized descendant of a parish founder. Non-descendants who are not residents in the parish must ask permission of a resident descent member to hunt or gather, and in the same way they can gain permission to settle as residents, build houses and clear gardens.⁶ Areas of forest, in effect unmodified by human labour, are thus held in common by all members of the parish descent group.⁷ The right to clear a garden in old fallow, or to build a house upon the site of a previous one is, in contrast, restricted in consideration of the ownership bestowed by the labour that has previously been invested in the site.

Just as the original founder of the parish was dindi aua, the "ground owner", so any man who clears a garden in the primary forest becomes mbou aua, the "garden owner". In the Duna view it is the labour expended in the hard work of clearing and establishing improvements which confers rights to land. In the years to come, when the garden reverts to regrowth fallow, the yango will belong to the original garden owner and his cognatic descendants, wherever they may happen to reside. Only men who clear gardens as non-descent members of the parish are excluded from passing on rights. Should a man not have descendants, his rights pass to his lineage "brothers" and their descendants. In practice, particularly when men of several lineages join in clearing a new garden, the number of people who can claim rights in the yango after a generation is quite large. Most of these people will reside in other areas of the parish or in other parishes, and they have no opportunity to meet together as a group. Since there is no shortage of suitable garden sites in the lower Tumbudu it is therefore accepted as a principle that anyone with a right in the yango who lives near it can either utilize it himself or grant rights to any other person, without consulting the other right-holders. After a garden area has passed through several cycles of re-growth and re-clearing, particularly if some of the men granted rights to re-clear belong to lineages other than those of the original cultivators, the question of rights in the plot becomes too complicated to determine. A man interested in clearing an area known to have been gardened many times before will, at most, ask a nearby garden owner (preferably an agnate) and then proceed unless objection is raised. A number of the men I asked had no idea who had cleared their garden sites before them, nor was this a matter of any interest to other men of the parish. So long as good sites are freely available there are no problems, although changing circumstances may pose insoluble difficulties. My assistant, Irari, for example, wished to fence an old yango area for cattle.

103.

Suitable ground for cattle is scarce at Horaile' and although several men with rights in the *yango* said it was all right, other right-holders heard of the proposal and objected. The matter was discussed intermittently for months until Irari finally dropped his plans since no agreement could be reached.

Although women hold equal rights in principle with men, both in parish common land and in the garden sites of their fathers and ancestors, in practice they are rarely consulted for permission or opinion. The dominant virilocal marriage pattern ensures that most women reside away from the places where their fathers have cleared gardens, so that they spend most of their lives working in gardens in which they have no ground rights while remaining uninformed about the comings and goings of men on their own land.

Rights in trees that have been planted, nut pandanuses, figs (valued for their edible leaf-buds) in the upper valleys and marita pandanus in the lower valleys, are much like rights in garden plots. However, mature pandanus holdings are valued much more than fallow garden plots and men more often come into conflict over them. When a man leaves a parish where he has holdings he may leave them in the care of a kinsman, in which case he will return yearly to harvest, or he may dispose of his rights completely by accepting a pig in exchange. Inheritance rights are again cognatic in principle, although prudent men will allocate their holdings individually to their sons to prevent disputes. Women rarely acquire holdings except in instances of uxorilocal marriage when their husbands oversee the inheritance. Casuarina trees and pine trees, although planted, are simply abandoned without further thought whenever the "owner" moves away.

In this section the value of land has been considered in relation to rights in land, that is chiefly in terms of ownership, of relations rather than forces of production. Other anthropologists have made this connexion of exploitation a central focus of their studies, and Meggitt (1959) and Glasse (1968) have argued for an intimate relationship between availability of land as a productive resource and

v

16/

principles of ownership via descent group membership. Although I am not concerned with this problem, the reader familier with studies of land tenure in the Highlands should appreciate the magnitude of the difference between Duna practice and practice in high intensity systems. Glasse, for example, reports that arable land is plentiful in the Tari area and that Huli rarely quarrel about garden rights. He attributes the Huli cognatic descent system, which is similar to the Duna system in its main features, in part to the lack of pressure on land resources. Although the Huli and Duna share common principles of descent (as well as the same basic principles of land tenure) they cannot be said to experience land holding in the same way. The majority of garden plots in the Central Tari Basin are of fixed dimensions with raised earth walls often planted permanently with trees." In one Huli parish Glasse was able to make a detailed survey and "search the titles" to each garden and fallow plot. He found, among other things, that many parish residents held no title to parish garden plots (Glasse 1968). By contrast, among the Duna almost every resident member by descent in a parish holds title to the land he gardens. And although these titles are in principle retained when gardens revert to fallow, in practice Duna are able to treat most rights in fallow with casual disregard. Gardens are irregular or round rather than rectangular in plan, fenced and not walled, and subsequent gardens on the same spot rarely follow the same fence lines and dimensions. Land tenure soon becomes a hodge-podge of over-lapping rights which subsequent cultivators are happy to ignore. Duna are well aware of the easy-going character of their system. One Duna story tells how Huli men began a war over the disputed ownership of some ants: "Huli men will fight about anything, they're so crowded on the ground". An intermediate situation exists in the upper valleys of Duna country. Here men keep a watchful eye on their fallow plots and do not relinquish claims when they move elsewhere, lest they find someone else cultivating the site on their return. I was told that disputes between individuals over garden plots were fairly common, though I doubt they could be as frequent as the "low incidence" reported by Glasse for Tari. In sum, although the Huli evidently experience so little pressure on land resources as to have a negligible effect on their principles of land

tenure and descent group membership, the difference between Huli and Duna practice would seem to be of a magnitude comparable to that between Huli and Enga (the latter being a difference in the direction of intensification, the former a difference in the direction of under-development).

is-

/7/ Anda ("Homestead")

Production activities in Duna country are spatially organized around homesteads scattered throughout parish areas. Each homestead typically consists of one, two or three small, rectangular houses with earth floors, low walls of wood planks, and roofs of pandanus leaves or (nowadays) grass thatch (Photograph 6a). There are separate houses for men and women, or occasionally separate compartments with separate entrances under a single roof. There are no family areas in Duna houses, nor are there separate menstrual huts for women. Adults scrupulously avoid entering houses occupied by members of the opposite sex and only children are able to come and go between all the houses of the homestead. If a man wants a pig-rope or other item from his wife's house when she is not at home he will wait for her return or send a child or another woman to fetch it. Men's houses are usually built within the confines of a garden fence, while women's houses are located outside. A few women's houses are surrounded by garden but connected with the forest or scrub at the perimeter by a fenced passage-way for pigs. Since the daily routines of the men and women of a homestead are largely independent of each other, men sometimes build their houses at a distance from their women's houses. In some cases the houses and gardens of other homestead groups can even intervene, so that the homestead can no longer be recognized as a spatial unity.

Except in wet weather, homesteads are unoccupied during the day while the residents are at work or at rest in their gardens or elsewhere. In the early afternoon women from adjacent homesteads gather in their gardens to prepare an earth-oven in which vegetables, greens and often mushrooms or nuts are baked. Men also gather in small groups to bake their food away from the women, usually at a homestead or *anoa noma* (men's meeting place) on high ground where messages can be heard as they are yodeled up and down the valley. Men's meals have fewer types of greens and wild foods, although they more often enjoy sugar cane and the bright red sauce of the marita pandanus.



Later in the afternoon children are dispatched to fill gourds with water for the night, while men return briefly to their garden to harvest sweet potato for the night and following morning if they have not already done so. Women return to their houses burdened with sweet potato for themselves, their children, and their pigs; carrying as well pieces of firewood on their heads and infants slung in net bags balanced on top of bags full of sweet potato. A few men keep pigs at their houses as well, although this entails a degree of social disadvantage avoided except by bachelors and more retiring older men. While other men often stay overnight at the house of a friend or kinsman, or at the *anda pirape* (meeting house) of their local *noma*, men who personally tend pigs must always return to their homestead by nightfall with sufficient sweet potato.

17/

As cloud mists descend and late afternoon turns to darkness the pigs return to each homestead from neighbouring areas of forest where they have foraged during the day. After being fed with raw tubers they are tethered in stalls inside the house or under the roof-eaves. Housefires are rekindled from embers surviving from the morning; scraped tubers and leaf-wrapped bundles of greens are buried under hot coals to be eaten later in the night. Children usually sleep with the women of the homestead, though men sometimes keep them at night instead saying that they will not cry for their mothers because they will receive better food from the men. House entrances are barred with planks and the occupants pass the night in isolation from the other houses of the homestead. In men's houses some men sleep while others talk or sing *pikono* stories until late in the night.¹ Periods of sleep and wakefulness alternate through the night. Sleepers awaken to add wood to the fire and stare into the flames, others to relate dreams to their house-mates. In the early morning the doorways are unboarded and the pigs released from their pens. A few small tubers are quickly roasted, or left-overs may be eaten from the night before. Women leave early for their gardens, as do men who are engaged in felling trees for a new garden or setting out to visit kin at another parish. Other men may remain at the homestead for an hour or two longer, roasting tubers, napping, smoking and talking, or working at the manufacture

107.

of net bags or other craft items before finally boarding up their house and setting out for the day.

Although some people occupy the same house for eight years or more, others prefer to move more frequently and so escape the miseries of a leaking roof and the inevitable accumulation of clutter, filth, fleas, and cockroaches.² A new house may be located at the old house site, elsewhere in the parish or in a new parish. Moves between parishes are a part of the broader pattern of shifting associations with different groups of kin which are typical of Duna sociality, while moves within the parish are mostly prompted by a desire to try gardening in a different spot. Occasionally, however, men move to a new location within the parish to ease tensions with their "father", "uncles" and "brothers" of the parish. The usual stragegy in establishing a new homestead is to clear a garden first and bring some of it into production so that food will be available when women, children and pigs are moved from the previous location. A women's house is then built and the move completed, the men of the homestead sleeping with kin nearby or camping under the eaves of the women's house until a men's house is completed.

Pigs play some role in determining the location of the homestead. Ideally, each homestead should have an adjacent area of forest where pigs can roam unattended during the day. This practice contributes to the spacing of homesteads, as one man explained when asked why the Duna could not live together in villages: "pigs would fight and women would be angry with each other because of their pigs fighting. Also, children would steal from other people's houses if we lived close together". A few men claimed as well that pigs had determined their residence in a more direct sense: having shifted homestead sites, sometimes to a new parish, they found that their pigs continually returned to the old neighbourhood — and so they had to move back again.³ Typically, however, the location of a man's homestead is determined by the location of his kinsmen's residences and the possibilities offered by new garden sites. In the upper valleys the need for adequate foraging areas for pigs imposes some restraint on the clearing of gardens. Special areas along the Tumbudu and in little ravines are considered to be reserved for the pigs. Men who clear gardens here risk the anger of their fellow parish members. In the Tari Basin with its greater population density the practice of open foraging by pigs seems to be replaced in part by closer confinement. Marshy areas are reserved for pigs and at the end of each garden cycle pigs are turned loose within the walled garden plots to root out remaining tubers.

109.

Just as *anoa noma* ("men's clearings") are spatial centre-points for the organization of public affairs of each lineage, so homesteads are spatial centre-points for the organization of production activities by each domestic group. And as domestic groups, homesteads are also reproductive as well as productive. They are reproductive in a double sense, both concerned with the day-to-day nourishing, sheltering and care necessary for the daily "reproduction" of each person as a producer and/or consumer in the economy, and concerned with the generation-bygeneration reproduction of the population, of the workforce and of the people as a whole — a matter of sexual reproduction." As the locational centre-point of both the dominant social relations involved in production and of the reproduction of labourers (and consumers) who daily and generation-by-generation carry out production among the Duna, the homestead may be considered as pre-eminently the locus of the factor of "labour" in the classical formula.

In this aspect, the aspect of labour, it is important to appreciate the extent to which homestead are *men's* homesteads. Men build the homesteads and say that they "own" them. (Otherwise only a few widows with houses left by their husbands are said to own homes.) Every man is able to construct a house, although most men call upon their neighbours and kinsmen for help, while a few prefer to pay a pig in exchange for having a house built for them by another man. Young men without wives often live together with some older man at his homestead, and some continue to do so even after acquiring a wife and building a women's house. Eventually they acquire homesteads of their own. Only

171

a very few men never establish a homestead and garden of their own. These are the "rubbish men" of Duna society, known as *anoa piaro* ("man stink-bug"). These men travel about from place to place, attaching themselves to the households of kin and influential/generous men in turn, always present when pigs are being killed and usually absent when there is work to be done. Their position seems due to their own inclination and not to any lack of access to land or the other means of production. All other men arrange homesteads for themselves, and in doing so they organize a labour force about them.

But since garden and pig production cannot proceed without the facilities and material equipment located at the homestead, the houses and their contents may be broadly considered in a second aspect as producer's capital or as instruments of production.

The tool kit which enabled the pre-contact Duna to appropriate value from nature consisted of the same simple items found throughout Highlands New Guinea: bow and arrows, stone axe, flint flakes, bone awls, bamboo knife and fire-starer. Since the tool kit is much the same everywhere and most of its items are readily procured directly from nature, it cannot have any great part in facilitating differential intensification of production. The stone axe poses a possible exception. Before the arrival of steel, axe blades were scarce in the Tumbudu Valley and a few men related that there had been times when they were unable to commence gardening for lack of an axe. A greater supply of axe blades might have elicited greater production and it cannot be ruled out that advantageous location in relation to trade routes or quarries may have been a factor in the greater production of the highintensity Highlands societies (see Hughes 1973). As well, the efficiencies gained through the adoption of steel axes are well known (Salisbury 1962; Townsend 1969) and it should not be forgotten that available production figures for Highlands societies are all derived from the steel axe period.

Although differential access to tools as instruments of production is an all but negligible factor in productive relations among men, the same is not true when the position of men is viewed in relation to women.

17/

Only a few women in the past owned axe blades, and these were almost always small, inferior items suitable only for the chopping of firewood. Women are not considered to posses the strength necessary for the clearing of gardens in forest. Nor are women able to build houses, to strike flakes of flint or manufacture the paddle-shaped wooden "shovels" which they used before the introduction of steel.⁵ There are in fact no female craft-specialities upon which men are totally dependent, while many male specializations assure the dependence of women. This is an important factor in the determination of Duna relations of production which will be examined in Part Three of the thesis.

Ctan J

/8/ Mbou ("Garden")

there";

"My garden: I make a big garden. In some places the sweet potato grows well, where the ground is good. Where the ground isn't good it doesn't grow well. Where it grows well, women look after it and harvest it. Men harvest it too. We feed it to pigs. We carry it home and cook it. We give it to our children to eat, so that they won't be hungry. When we think of gardens we think of the sweet potato that grows in them. Everything comes from this.

- Yopa of Horaile', February 1972.

I interviewed 11 Horailenda men about their past gardens and found that each man had cleared on average 8.6 gardens over an average period of 27.5 years, or 3.2 years per garden (Table 8:1). Of the 95 gardens they remembering clearing, 52 (55%) were cleared from primary forest, the remaining from *yango*, bush-fallow.¹ Various reasons were given for abandoning each garden in turn, typically:

"yao (no reason), I was just tired of my old place"; "I was tired of Iglalu (place) and Lapu (informant's father's brother) was at Aiyukoro (place) so I went

"Later, I was angry with Lapu, so I went to stay with Karu (informant's friend)";

"All my pigs died at that place. I went back to my old house-site at Aiyukoro and made a garden nearby at Kelodege";

"I could see from the vines and leaves that sweet potato would never grow well at Dakiambu, so I told Warua (friend) to stay there with our pig and I'd start a new garden down below at Peropiakaki. Then we could feed the pig when it grew big";

"One of my pigs went back to Dakiambu. I went back there again, thinking I'd live there because the pigs weren't right at Wapi and I was tired of the place anyway. But I hadn't been long at Dakiambu when I got really sick. Ambuya (another man) came and divined by muttering spells over a handfull of earth. It was my father and his *dama* (familiar spirit) who were making me sick. So I went back to Wapi and killed the wayward pig at my father's house-site. Then I went back to Dakiambu and got better, but I didn't stay there; I went to Dugubikakao, as I was thinking of that place"; /8/

"Wild pigs and other men's pigs kept getting into this garden everywhere. I had been there for a long time and the fence was broken in many places. Then a wild pig jumped the fence and impaled itself on a stake I'd put there. Then everyone came to eat the pig and they all climbed over the fence at different places and wrecked it. I was really fed-up then, so I left".

Similarly, new garden sites are selected because they are convenient to where one wants to live (because of kin or friends), or because the site itself seems promising. No clear preferences are expressed for forest sites or fallow. Hondua said: "Bush is hard work, but so is yango. [Q. Will you make your next garden in yango or bush?] I haven't made it yet. I'll know when I think about it later". Somewhat more forcefully, Kemeru explained: "If I like bush, I'll clear in bush; or if I think of yango, then that's what I'll clear. But bush is best, since everything will grow in a bush garden".

One reason for prefering forest to fallow areas, apart from the promise of higher yields and the praise from one's fellows for such a demonstration of personal strength, lies in the advantages for fence construction. In fencing areas with an abundance of large trees, the Duna technique is to begin by felling trees about the perimeter of the garden, and then by rolling and shifting the logs with levers to build up a log wall supported by props outside the garden (Photograph 6b). With logs 20 m and more in length the work goes quickly and, apart from the need for occasional renewal of props, lasts for ten years or more. By contrast, in gardens cleared from yango it is necessary to either dig ditches around the plot or to fell suitable trees at some distance, split them into stakes and carry them to the garden site. The stakes are driven into the ground and held in place with lashings of vine or rattan. Where suitable regrowth saplings are available, they may be incorporated into a stake and pole fence (for a similar example see Clarke 1971:161). Such fences (the usual practice throughout most high intensity areas of the Highlands, due to the deforestation which accompanies dense settlement) require repairs within two years and are often breached by pigs before that happens.

113.

llame	Estimated Age	Est.years gardening	Forest gardens	Yanao gardens	Total gardens	Years per garden
Ambulu	41	27	2	7	9	3
Kendo	24	7	2	1	3	2.3
Tsewagu	66	54	5	6	11	4.9
Dunduitsa	47	25	3	2	5	5
Koria	40	28	8.5*	3.5	12	2.3
Paba	37	25	3	1	4	6.3
Alu	34	22	4.5*	.5	5	4.4
Yoko	32	20	5 °	- 5	10	4
Hondua	47	35	7	5	12	2.9
Tsanoa	36	- 24 -	6	6	12	*
Kemeru	47	35	6	6	12	2.9
Totals		302	52	43	95	1-1
Means		27.5	4.7	3.9	8.6	3.2

Table 8:1. Garden interviews with Horailenda men; gardens at Horaile' only.

Half-forest and half-fallow gardens account for the fractional entries.

Those trees that are not felled for fencing are climbed and pollarded. Only men who fear climbing will resort to the more common Highlands technique of ring-barking. The trees are then left standing in the garden to dry and die, to be felled later when required as firewood or building material. Edible grubs (dili) are also harvested from them. Clearing of the ground and burning is women's work. The tree-loppings are stacked against tree trunks and burned when dry together with the small amount of undergrowth which presents little difficulty in gardens cleared under the forest canopy. No attempt is made to burn-off the garden in a single firing, and small fires are lit whenever there have been a few days of dry weather. The ash-enriched soils at the bases of trees are reserved for special crops such as tobacco and (nowadays) maize and pumpkins. The next and often final step in the men's work of preparing the garden site involves a rough breaking-up of the soil with the aid of a stout pole with a sharpened end. Wherever possible larger roots are severed with an axe and levered out of the ground. In former days this was a risky business, since a man might strike a rock in the soil and ruin his stone axe blade.

Sweet potato is planted by two different methods: either directly into the further unprepared ground, or planted into a prepared mound of topsoil with 8 to 15 vines per mound (photograph 2). The simpler method is called hina tse ("sweet-potato base") and the mounds are mondo (which is the same term employed by Huli and Enga for their sweet potato mounds). People say "women know about mondo and men know about tse," although in fact women sometimes plant tse and men sometimes prepare mondo. Women do not weed or harvest tse, however, because the vines are planted close together and it is thought that any tuber a woman steps over becomes contaminated by vaginal poisons (tsome).2 The mounding technique permits women to walk through gardens, weed and harvest without danger of stepping over food plants. In any event, the tse technique is thought to produce inferior tubers and is usually only employed in rocky ground or as a first or second crop in a new garden where the soil has been insufficiently worked for mondo. Men who are unable to obtain sufficient female labour also sometimes resort to tse plantings rather than trouble themselves with the extra effort necessary for mondo.

Duna mondo are circular rather than the oblong shape found in Huli country,³ and they are considerably smaller than the circular mounds of Enga country, A typical Duna mondo is about 2 m in diameter and .4 m deep. Walkways between mounds measure about .6 m and there are around 1800 mondo per hectare. Waddell's (1972) study of Enga mounding practices led him to the conclusion that "no single function could be ascribed to the practice of mounding", though a number of. effects could be discerned in varying degrees. Enga mounds protect crops against frost damage by draining cold air from the site. It also seems that the decomposition of mulch within the mound raises the soil temperature and thus promotes plant growth. As well, the mulch maintains the fertility of the soil under periods of 30 years or more of continuous cultivation. By contrast with Enga practice, Duna mounds contain

little mulch material and *mondo* in gardens cleared from forest are not mulched at all. Frost is not a problem in the Tumbudu Valley and periods of continuous cultivation (except along river flats) rarely exceed 10 to 12 years in the lower valley. The mounds provide for the accumulation of topsoil depth in areas where the soil is shallow, and their height above the surrounding walkways helps to prevent tubers from rotting in poorly drained areas.

116.

However, neither shallow soils nor poor drainage are features present in every mondo garden. More than anything else, the mondo appears to provide a conceptual unit for the management of gardening, as well as a method for minimizing the believed-in dangers of female pollution. 4 Once the initial preparation of a garden site has been completed by men, all of the remaining steps in cultivation can be carried out by women with a minimum of supervision. Women decide how many mounds they will prepare in any given work period and in which part of their garden area they will prepare them. They maintain their own schedules of weeding and harvesting, while mounding goes on throughout The year so that different mounds are constantly coming to maturity in different parts of the garden. Mounds are usually harvested twice, approximately 5 and then 6 months after planting, after which they are either re-formed or left for re-mounding later. In re-mounding an area, women decide how much mulch to use or if re-mounding will be worthwhile at all in view of past yields. Each woman works individually, with no co-operation or co-ordination of their work with other women. The main point to be appreciated about the mondo technique is that each mound can be thought of as a garden in miniature, with its own readily estimated labour requirements, timetable of production and expectable yield.

18/

1

The gardens at Yuku

/8/

120

Early observers in Duna country noticed that as they left the Tari Basin and travelled into the region of poorer soils and rough limestone country towards the Strickland, small, regular garden plots gave way to large hillside garden areas, each contained within a single They wrongly assumed that these were communal or collective fence. gardens (see Clancy 1954: Anon. 1962). To explain the process by which these gardens are formed and further explore the organization of garden production, I shall present a single case in detail, a large garden area of about 8.6 ha surrounded by a single pig fence at a locality known as Yuku, close by my field base in the upper part of Horailenda parish. As shown in map 8:2, the Yuku mbalaya pukuo ("big fence") has grown through a series of additions, fenced and cleared by twelve men working over a period of about ten years. Prior to that time there was only primary forest at Yuku, although there were other gardens in existence on ridges to the east and west. The Yuku area consisted of a forested ridge extending into a narrow arm at the northwest where the ground dropped away steeply into ravines and sinkholes. Men try to take advantage of such topographic circumstances to reduce the amount of fencing required, and to provide convenient nearby areas for pigs. Hukunane, an agnate of Hagine' parish, came to Horaile' with his family about 1955 from Nauanda where he had been staying with unrelated "friends" (nendeke). Horailenda was his father's mother's place, the place of Domai damene (lineage). Hukunane first went to live near his sister's husband's people, Wetsene damene men who were gardening in the lower part of Horaile. He next began a garden at Andukudege ("Fig Hill"), two ridges to the east of Yuku, where he was near none of his kin. Finally he and his sons and two of their friends began felling trees at Yuku in 1960 (garden 1). Yopa and Kualu of Domai were at that time gardening on the next ridge to the west. Hukunane was about 42 years old at the time, and his eldest son, Palapa, about 14. Patsi of Nauwe damene, who joined them, was about 20, and Wei of Domai the same age as Palapa. Their first garden comprised about .34 ha, with a men's house within the fence and two houses for women and pigs just outside the lower fence. The soil here proved good and large tubers were harvested from the garden, so it was

117.

/8/

.63 ha). The following year Hukunane and his two sons, unaided by Wei and Patsi, cleared a further area of .67 ha (garden 3), while Wei and Letsona together added on a small V-shaped section of fence to garden 2 (garden 2A). A much larger addition (garden 4, 1.19 ha) was then commenced, but Hukunane fell ill and died before the work had progressed far. People often shift homesteads following a death, sometimes explaining that they are "angry"-(lembo) about the place. In this instance, the situation of Hukunane's house had not been a good one in any case, since the surrounding ridges prevented the occupants from hearing shouted messages and created too great a sense of isolation. Palapa and Letsona decided to shift the homestead to a point on the ridge between Yuku and Andukudege, some 600 m to the east of the old site. Palapa, Patsi and Wei completed garden 4, while Letsona, Patsi and Wei prepared a garden of .33 ha surrounding the new homestead (not shown on map). In the meanwhile Palapa joined with Lokoria, a youth of Paba domene, in the clearing of garden 5 (.52 ha) between garden 4 and a large sinkhole which required little further fencing. Both the joining together into work-groups of "friends" from different lineages and the decision of Hukunane's two sons to work separately are typical of Duna arrangements for production and other activities. Late in 1968, Letsona and Lokoria decided to sign onto the Highlands Labour Scheme for a two-year period working on a coastal rubber plantation. The remaining men joined forces with Wei's younger brother (Wepera), his father (Kualu) and father's brother-in-law (Wareya), and resolved to fence an area even bigger than the combined gardens so far. (Kualu and Wareya had previously been gardening together with Yopa, Koria and several other men in an area 350 m to the west of Yuku; see also figure 8:3, genealogical relationships of gardeners at Yuku).



Contour lines are suggestive only. Fence lines are shown for the sequence of garden sites as originally cleared.

Genealogical connections among gardeners at Yuku, Horailenda



Table 8:4.	Garden partners at Yuku
Men	Women
Wepera	Yauwi (no close relation - damene "father's" mother)
Wareya	Daiyame (Z); Kotari (no relation)
Patsi	Daiyame (dist. damene "sister"); Kotari (no relation)
Kualu	Daiyame (W); Kumbame (distant affinal relation)
Wei	Daiyame (M); Okone (distant damene "sister");
	Waluma (distant affine); Kotari (distant damene
	"sister")
Kane and Kuari	Hakame (M/W)
Palapa	Pangale (M); Waluma (distant affine); Kotari (Z)
Letsona	Pangale (M); Kotari (Z)
Lokoria (absent)	Kotari (no relation - sister of an age mate)
Hewa	Tsame (W); Dandaga and Daiyame (daughters)
Koria	Kumbame (Z): Arepa (W)

Yukuli (gardens with Kotari, a *domene* "sister", on a patch belonging to Palapa and Letsona).

Adult Members of Homesteads .

Hukunane's	ď	Palapa, Letsona, Patsi, Wei, Kane	
homestead:	ę	Kotari, Pangale, Yukuli, Waluma	
Kualu's	o"	Kualu, Wepera	
homestead:	9	Daiyame	
Wareya's homestead:	ď	Wareya	
Koria's	ď	Koria	
homestead:	₽.	Yauwi, Arepa	
Hewa's	ð	Hewa	
homestead:	٩ ٩	Tsame, Dandaga, Daiyame, Kumbame	
Kuari's	ď	Kuari	
homestead:	Q	Hakame	

/8/

Table 8:5.

Garden plots within Yuku "big fence", 8 July 1970

Plot	Male	Famala	÷
identif-	Owner	Partners	Commonto
ication	ounor .		commence
۵	Wepera	Yauwi	planted 2 menths are
А	nopora	(Koria's M)	pranted 3 months ago
В	Wareya	Wareya and	planted 2-3 months ago
		Kotari	-
B ₁	Wareya	Daiyame	planted 1-2 months ago
	Deci	Datasa	
C	Pasi	Dalyame	planted 1-2 months ago
D	Kualu	Daivame	planted 7 months ago
-			almost completely
			harvested
D ₁	Kuala	Daiyame	not yet planted
^D 2	Kuala	Kumbame	planted 2-3 months ago
	57-4	Delaura	0
E	wer	Dalyame	8 months old, mostly
17 .1.		- 1º 1/	haivested
E.	Wei	Daivame	now being cleared and
1		. Set	mounded
ione:			
E ₂	Wei	Okone	planted 3 months ago
-	· · · ·		
E3	Wei	Waluma	planted 8 months ago,
	1		hall halvested
F	Kane &	Hakame	planted from 8 months
	Kuari	Indificunt	ago to present
			o
F	Kane &	-	now being cleared
	Kuari		
			1 to 1 4 0 months and
G	Palapa	Pangale (M)	planted 4-9 months ago
C	Dalama	Waluma	planted 6-8 months, mostly
° 1	Palapa	Waluna	harvested
5		XCS	-
G	Palapa	Waluma	now being planted, some
4		· · · · ·	2 months ago
G	10 × 1		1. 2 months at bottom.
G ₃	Palapa	Kotari (Z)	1-2 months at pottom; 5 months and ready for
			barvesting in middle:
100	4 1 +		9 months, all harvested
		·	near fence and top
	-0)浜	the second se

4 , 1

/8/

4

(The upper fence was built between January and October 1969; the nearby house is occupied by Palapa's sister and Yopa's first wife).

н	Hewa (given by Palapa)	Hewa's wife and two daughters	planted 1 month ago; some now being planted
I	Koria .	Kumbame (Z)	cleared 9-12 months ago; now being planted
Ι,	Koria	Arepa (W)	cleared 9-12 months ago

(The fence in Koria's section was built by him alone in January 1969, at the same time that Kualu and his "friends" were starting on the communal fence proper. Koria wanted to work fast; he didn't make a big garden. The others joined their fences onto Koria's section later).

J	Wei	Daiyame	last planted 3 months ago but mounded 6 times before
J.	Wei	Waluma	mostly old mounds, being remounded now
K	Pasi	Kotari	mostly old, with scattered new mounds
r i ve	Letsona (absent)	Pangale	mostly old mounds
' ^L l	Letsona (absent)	Pangale	a few mounds, 1-2 months old, in grass
M	-	Kotari and Yukuli	an independent women's garden, being harvested and remounded now
N	Palapa	Kotari	mostly old mounds; see R, R ₁ , R ₂
P	"Hukunane"	Pangale	current mounds 4 months old, mounded at least once before (to be eaten by Pangale and Palapa)
Q	Pasi	Kotari	mostly old mounds
R	Palapa	Pangale	1 month old, remounded
Rl	Palapa	Pangale	mostly old mounds
R ₂	Palapa	Waluma -	mostly old mounds

11
SLetsonaKotariold mounds onlyTLetsonaKotarito be harvested in a month/ given by Letsona to Kotari when he left for nambis; Letsona has never harvested thereUPalapaPangalenearly ready; cleared by Lokoria, planted by PalapaVPalapaPangale1 month old mounds/ part of original No. 2 garden - same plot as RWLokoria (absent)Kotari3-4 months old				
TLetsonaKotarito be harvested in a month/ given by Letsona to Kotari when he left for nambis; Letsona has never harvested thereUPalapaPangalenearly ready; cleared by Lokoria, planted by PalapaVPalapaPangale1 month old mounds/ part of original No. 2 garden - same plot as RWLokoria (absent)Xotari3-4 months old	S	Letsona	Kotari	old mounds only
UPalapaPangalenearly ready; cleared by Lokoria, planted by PalapaVPalapaPangale1 month old mounds/ part of original No. 2 garden - same plot as RWLokoria (absent)Kotari3-4 months old	т	Letsona	Kotari	to be harvested in a month/ given by Letsona to Kotari when he left for <u>nambis</u> ; Letsona has never harvested
UPalapaPangalenearly ready; cleared by Lokoria, planted by PalapaVPalapaPangale1 month old mounds/ part of original No. 2 garden - same plot as RWLokoria (absent)Kotari3-4 months old				there
 V Palapa Pangale l month old mounds/ part of original No. 2 garden - same plot as R W Lokoria Kotari (absent) 	U	Palapa	Pangale	nearly ready; cleared by Lokoria, planted by Palapa
W Lokoria Kotari 3-4 months old (absent)	V	Palapa	Pangale	l month old mounds/ part of original No. 2 garden - same plot as R
	W	Lokoria (absent)	Kotari	3-4 months old

(Lokoria's first garden at Yuku, originally as addition to No. 2 garden fence. Kotari now harvests solely - "she's a strong woman and looks after everybody's gardens".)

x		Pasi	Kotari		l month old, garden	part of No.	2
Y		Hukunane	Pangale		4-6 months ol	ld; only	
*	1	& Letsona		1	Pangale harve	ests	
z		Given by Hu	ukunane	Sel.	to Letsona,	female	
^z ı		partner Par crops 4-6 r fence added	ngale, and months old d to origi	to Wei , only 1 nal No.	, female partr Pangale harves 2 fence by We	ner Kotari; sts. Z and ei and	z ₁

As all of these men had productive gardens they were able to devote their efforts to the construction of the fence for garden 6, leaving the pollarding and clearing of the enclosed forest and preparation of the soil until later. A sixth man, Koria of Nauwe, wished to join them as well, but as he required a productive garden as soon as possible he decided to work on his own and suggested that the others might join their fence to his fence (garden 7, .31 ha). Koria's young nephew Kane joined with the others, and this reinforced his suggestion. Later on Kane too joined the Highlands Labour Scheme and his father took over the clearing and cultivation of his son's plot within the big fence. Finally, Palapa marked out a small plot within garden 6 and gave it to Hewa of Nauwe to cultivate. This brings the configuration of the garden area to its state in 1970 when I surveyed it. In the next few years Koria and Tserepu of Domai added further gardens to the southeast, but I did not record the details of these additions.

Thus what began originally as the small pioneer garden of Hukunane grew over a number of years into an extensive area containing the gardens of thirteen men. Examination of their genealogical relationships shows that the process by which men joined in this enterprise was somewhat analogous to the process by which the garden itself grew: men who were more or less genealogically "adjacent" to one another joined together in the common garden area by a series of somewhat haphazard accretions, sometimes as domene "brothers", sometimes as friends and sometimes as The "big fence" is not the garden area of any one lineage, affines. and almost all the men who garden within it have gardens elsewhere as well (most of which entail further relations with yet other men of Horaile'). The end result, both in garden plots and in social relations, is not the realization of any initial plan, although it is nevertheless typical of social processes as Duna understand them: "First a man thinks he'll start out on his own, away from others; but later on everyone comes and joins him. 'Good', he'll say, 'before there was just me here, but now you've all joined with me. I praise you all.

When a number of men, whether "brothers" or men of different damene, join together in fencing an area, they always allocate to each man his own section of garden before proceeding to the individual work of pollarding, burning and soil preparation. This is called *dindi aloya*, "marking the ground". Cordylines or taro plants are sometimes set out as boundary and corner marks, but most men simply agree among themselves that certain tree stumps or rock outcrops represent *alo* which provide for a fair distribution of the garden area. Because not all the ground within the garden is of the same quality, and because some gardeners seem to get better results than others, the allocation of garden plots is sometimes a source of bad feelings. Duna stories tell of brothers who have come to blows over the problem of marking out a garden, and some men prefer to work alone rather than risk involvement

1

in possible disputes. Tsanoa of Horaile', for example, told me:

"it's not right to make a garden with other men. When men make a garden together it doesn't matter how they mark it out, sweet potato grows well in some places and not in others. Later on they see this and someone is angry about it. If I work on my own, then it's my own affair".

However, I did not encounter any cases of actual disputes in this connection and suspect that men like Tsanoa may voice these anxieties as a justification for their reclusive tendencies. Not all men wish to join in collective activities such as the Yuku big fence, and there is no part of the gardening process which obliges men to enter into cooperative work-relations with other men. A number of men at Horaile' do in fact garden on their own or solely with other male members of their homestead.⁶

On the other hand, when garden fences are added one to another, as at Yuku, fences within the outside perimeter are left to decay. Each man is responsible for the up-keep of that section of the common fence adjacent to his garden plot(s), although when pigs breach the fence it is usual for the pig owner to help with repairs and to pay compensation for damage done. By joining their fences together, men who garden within a common fence reduce the amount of fence building and maintenance required for their individual areas, although at the same time they increase their dependence upon each other, since every man must be counted upon to maintain his section of the fence. An increased efficiency of production is gained, but at the cost of an increased complexity in the organization of production, together with increased possibilities for break-downs and disputes.

Finally, as each man prepares his individual plot(s) he in turn allocates sub-plots to the women who will mound the soil and carry out the remaining steps in the production process. Each man enters into partnership with one or more women to mound and tend his plots, further sub-divided according to the number of female workers. Tables 8:4 and 5 record the sub-division of the Yuku gardens, the partnerships entered into, and the homesteads where the people involved normally resided. Men enter into partnerships with their wives, mothers, sisters,

classificatory "mothers" and "sisters", wives of classificatory "brothers" and other distantly related or even unrelated women. As in other activities, kinship is a context rather than a determinant of the relations established. Although wives, mothers and sisters (both married and unmarried) are the most common garden partners, they may choose not to work in their husband/son/brother's garden for a variety of reasons. Daiyame, for example, declined to mound her son Wepera's plot since she was already tending eleven other plots. Yopa's first wife (he had two) had left him and moved to Hukunane's homestead, where she worked for Wei and Palapa. Yopa's sister, Yukuli, was married to a Hagini' man but she often returned for extensive visits to Horaile'. She was living in one of the abandoned houses of Hukunane's old homestead at the time of my survey, and she had begun gardening in an adjacent area of abandoned garden without entering into partnership with any man.

/8/

Whether a woman enters into a partnership with a close kinsman or a more distantly related or unrelated man, the conditions of the relation are much the same. The woman mounds, plants and weeds her allotment in exchange for a portion of the harvest. Exactly what this portion is depends on whether or not she is also tending pigs for her garden partner and whether the partner is himself tending pigs at his own house. The most common arrangement is that of a man who has all his pigs tended by the women of his homestead. In this case the man harvests sweet potato for his own needs only and the women harvest for the requirements of themselves, their children, and the pigs in their care. The same procedure also applies in the case of pigs agisted with garden partners who do not reside in the homestead. When a man tends pigs of his own, his sweet potato requirements are correspondingly increased and he may consider it necessary to reserve some of the mounds tended by his partner(s) for his own use exclusively. Under this arrangement "one half" (or so Duna men say) of the mounds tended may be harvested by the woman. Finally, a few men employ women on a direct basis, harvesting the entire crop themselves and paying the woman a small pig, one or two dollars, or a quantity of pandanus nuts for their labour. 7

As in other parts of the production process, men say it is their role to make decisions to decide on boundaries and allocate plots, while women can "hear what men say, mondo the sweet potato, look after the pigs and not make trouble". If a woman asks for a particular part of a garden a man will try to give it to her, bearing in mind the need for harmony among his several partners. Co-wives are often dissatisfied with their allotments and prone to malicious gossip about the favouritism of their husband towards the other wife: "The other woman will then go to her husband and say 'I didn't mark the ground; you did'. The husband will sort it out by sending the women off to garden in opposite directions or different gardens".

129.

1.3

Area under cultivation

By measurement from aerial photographs I have determined that 29 Horailenda homestead groups averaging 5.4 members each had current gardens in December 1970 totaling 18.74 ha, an average of .65 ha per homestead and .12 ha per person (table 8:6).⁸ However, these areas represent neither total cleared areas nor total area under cultivation, but rather the area visible in the photographs as being formed into mondo. Total cleared areas (as indicated, for example, in my account of the gardens at Yuku) are considerably larger, since fenced areas contain scrub patches that have not yet been mounded, as well as formerly mounded areas which have been out of production for so long that their mounded appearance is all but lost. As well, a perimeter of trees are felled outside of garden fences to allow more sunlight into the garden. Finally, plantings of *tse* are not clearly recognizable in the photographs, although they would represent only a small fraction of the total area under cultivation.

In addition to sweet potato, *mondo* are planted with the usual variety of crops to be found elsewhere in the Highlands. There are no kitchen gardens, mixed gardens or one-crop gardens, although special taro gardens were formerly cleared in shaded forest areas. Increased attacks by insect pests may have been a factor in their abandonment.

£

.

~ .

the.

Table 0:0 norallenda nomesteda sample	Table	8:6	Horailenda	homestead	sample
---------------------------------------	-------	-----	------------	-----------	--------

Homestead head	0 [°] worker units	q worker units	total residents	consumer units	pigs	Ha under cultivation
Koria	1.0	1.0	4	2.7	5.9	.62
Kualu &	2.6	2.3	6	4.45	6.4	1.57
Palapa	3.2	3.0	7.	5.3	6.8	.70
Tsanoa	1.0	1.0	2	1,7	1.7	.15
Mokone	1.5	0	1.5	1.5	3.0	.40
Tsona	1.0	1.8	4	2.7	0.7	.08
Kalene	2.0	2.0	5.5	4.15	- 2.3	.17
Paua &	1.0	5.3	10	6.85	1.7	.24
Parapu	1.8	1.0	5	3.2	2.1	.37
Damuna	1.0	4.0	9	5.6	2.4	.33
Dunduitsa	1.0	1.0	4	2.7	2.2	.51
Mbokola	1.0	1.8	5	3.4	5.3	1.29
Alu	1.0	1.0	3	2.7	3.1	.20
Yaokone	1.0	1.0	5	2.7	3.9	.49
Lekaowe	1.0	2.0	3	2.4	3.1	.10
Kokopi	1.5	1.0	5.5	3.55	1.6	.13
Paro	2.0	4.8	7.5	5.0	8.0	.52
Kale	0	1.75	3	2.4	0.6	.10
Abulu & Polo	2.0	1.0	4	3.2	3.1	.55
Ukundua & Kangatse	2.0	3.8	6	4.6	8.2	.33
Yokei	1.0	2.0	4	2.9	2.3	.17
Karu & Yokoia	2.8	2.8	8.	6.4	6.9	.42
Tsope &	2.8	1.0	8	5.4	2.4	.14
Apuake, Kuri Paba & Yar	La,3.5	4.0	12	8.3	9.9	.45
Kolauwi	1.0	1.0	3	2.2	3.2	.38
Hatsiape & Kemeru	4.6	.1.3	7.5	5.25	5.0	.15
Dundaki	1.5	1.8	5	3.3	3.2	.64
Dambako	1.0	2.8	6	3.9	3.7	.66
Hora	2.0	2.0	4	3.9	3.6	.21
totals	48.8	59.25	157.5	112.35	112.3	12.07
means	1.7	2.0	5.4	3.9	3.9	.42

*6¹⁶.1

.

50.1

ř.

/8/

Taro is otherwise planted in low-lying damp ground within the sweet potato gardens, or along fence lines and in holes hollowed out in boundary ditch-banks. Sinkholes within gardens are a favoured site for marita pandanus and banana trees, since they provide shelter from high winds. Elsewhere, particularly around tree stumps, mounds are planted with tobacco, cucumbers, gourds, psophocarpus beans, ginger, and introduced tomatos, corn, beans, pumpkins, peanuts, passionfruits, Irish potatoes and cabbages. Sugarcane supported on poles is interspersed among the sweet potato mounds, as are clumps of greens: Setaria palmaefolia "pit-pit", D. tsapu), amaranthus, brassicaceae, Rungia klossii, Oenanthe javanica and introduced "apika" (cassava). Saccharum edule is unaccountably absent. Apart from the vegetables and greens sold at the Lake Kopiago station there are no cash crops." Although I collected no precise data on the relative importance of crops, sweet potato would easily account for 80% or more of garden production by weight with sugarcane, tsapu (setaria), bananas, cucumbers and greens accounting for most of the rest. Considering the predominantly forest integument of Duna gardens, their reliance on sweet potato seems unusually high since (as Clarke 1969 has observed) gardens tend to emulate the diversity of their surrounding biota. Despite their environment, Duna seemingly choose a more restricted diet dominated by sweet potato as a single major crop, a pattern characteristic of denser populations operating more intensive systems.

130.

To estimate the total area actually under cultivation in Duna gardens I have measured the areas of mondo in all stages of cultivation and the areas of harvested mondo currently out of cultivation in my detailed survey of the Yuku gardens. Sweet potato mounds are often left out of cultivation for several months or more after their second harvesting, and only by directly investigating each mound or questioning the cultivator can one always tell the difference between these mounds and mature but unharvested mounds. In the Yuku gardens 35.7% of all mounds were in fact out of cultivation, and by applying this percentage to the area of .12 ha per person of mounded garden an estimate of .077 ha per person under cultivation is obtained. Despite certain uncertainties of mapping scales,¹⁰ this seems a reasonable estimate

15

63

0

in relation to areas under cultivation reported for other intensive horticultural systems in the Highlands (subsistence crops only): Kapauku, .095 ha per person (Pospisil 1963); Kyaka, .15 ha (Bulmer 1960); Raiapu Enga, .14 to .17 ha (Waddell 1972); and Korofeigu, .16 ha (Howlett 1962).

Sweet potato yields

The question next arises of the productivity of the area under cultivation. As a simplifying assumption and because I lack data on other crops, I will regard all areas under cultivation and all production as if it were comprised of sweet potato alone. For the Duna system this seems a satisfactory convention; for other systems (such as the Raiapu Enga, where a prolonged dry season forces seasonal dependence upon yams and Setaria palmaefolia) it is less so.

The yield from each mondo is, as Duna recognize, variable, depending in their understanding upon the quality of the soil and the thoroughness of its preparation in the mondo process. Adverse weather conditions, either prolonged dry spells or wet and overcast periods, conditions of local exposure to sunlight, and the altitude of the cultivation may promote or retard the growth of the crop but do not, in Duna opinion at least, substantially effect the ultimate yield. I measured yields of sweet potato in a number of different gardens with different conditions and on this basis estimate the probable yield in tonnes per hectare (table 8:7). Several comments are in order:

1) The range of estimated yields varies from 5.9 t/ha from *tse* cultivations in a partially shaded position to 37.5 t/ha from a single mound prepared with unusual care and deep-mulched with ash and refuse. The entire range of variation is accounted for by Duna in terms of empirical variables. There are no magical procedures employed by individual cultivators to promote the growth of sweet potato.¹¹

2) Yields of 5.9 t/ha for *tse* and 8.7 t/ha for *mondo* were recorded in adjacent test plots under identical conditions, supporting Duna contentions that the less laborious *tse* cultivations produce an inferior yield.

Table 8:7

Observations and estimates of sweet potato yields, Tumbudu Valley

sample area sample weight mean weight estimated yields cultivation · conditions altitude location per tuber tonnes/hectare 196.4 kg 86 g 5.9 t/ha tse in newly cleared heavy 1525 m Horaile 334 sq.m forest, shaded position (Yuku) 175.6 kg 92 g 8.6 t/ha mondo in newly cleared heavy 1525 m 203 sq.m Horaile forest, shaded position, first (Yuku) harvest 108 g 3.5 t/ha mondo under continuous Horaile 1525 m 32.5 sq.m 11.3 kg cultivation 2-6 years, open (Kuiandago) position, second harvest 1375 m 9.9 sq.m 4.1 kg 38 g 4.1 t/ha mondo in paspalum grass fallow; Horaile (Yawikagi) open position; second harvest 1400 m 5.9 sq.m 11.5 kg 158 g 19.4 t/ha mondo in open forest at base of . Hagini a tree; first harvest 12.6 t/ha 148 g Porini 1400 m 11.1 sq.m. 14.0 kg mondo in open forest; clayey soils, first harvest (Arou) 246 g 37.5 t/ha mondo, well mulched with ash and 1675 5.9 sq.m 22.2 kg Harege garden refuse, in regrown forest fallow; first harvest 105 g Kelabo 1700 m 10.2 sq.m 11.8 kg 11.5 t/ha mondo mulched with ash and refuse in Miscanthus grass fallow; first and only harvest

Total of all <u>mondo</u> first harvests: 235.1 kg from 236.1 m² = 9.98 t/ha. This figures is biased towards the low yield garden (Yuku). Mean of all <u>mondo</u> first harvest means = 17.9 t/ha; mean of all <u>mondo</u> second harvest means = 3.8 t/ha. Second harvest total of 15.4 kg from 42.4 m² = 3.64 t/ha. These figures produce an average of 13.62 t/ha, averaging all data.

32

3) The yield of 8.7 t/ha from the test plot mondo in newly cleared heavy forest seems low in relation to the other observations. I am inclined to attribute this to the semi-shaded position of the garden plot, although other factors may be involved. Perhaps, to consider a possibility mentioned by Waddell in the other contexts (1972: 167), freshly tilled forest soils are actually deficient in nitrogen and phosphate due to soil micro-organisms using up the readily available supplies in the process of decomposing an excess of raw organic matter.

4) While the yield of 37.5 t/ha at Harege seems unusually high, both the greater size and number of tubers in this large mound were immediately apparent in the yield trial — this is not a chance error in the data.

5) Gardens at 1700 m in the upper valley at Kelabo are near the valley floor and hence subjected to nightly accumulations of cold air,unlike gardens at 1675 m at Harege, half-way up the valley side. Local informants said that introduced varieties of sweet potato required six lunar months to come to maturity (a month longer than in the lower valley), while pre-contact varieties required 7 to 8 months. Only a single harvest from each mound was said to be possible at Kelabo, due to rapid growth of grass and weeds following initial disturbance of the mound. Weeding at this stage is unnecessary in the lower valley, where sweet potato leaves soon completely cover the mound and weeds seem less prevalent due to the forested surroundings.

6) The total of all *mondo* first harvests observed is 235.1 kg from 236.1 m², an average of 9.98 t/ha. The total of the two observations of second harvests is 15.4 kg from 42.4 m², equivalent to 3.64 t/ha. The two figures combined suggest an average yield of 13.62 t/ha for each mound cycle of approximately 185 days.

Some comparable figures from other areas of the Highlands are available:¹²

a) For Huli of the Tari Basin, employing mounding techniques in volcanic soils at an elevation of around 1600 m, Glasse (1968:21) reports "up to twelve tons per acre per year", equivalent to metric 30.1 t/ha.

b) For Mae Enga of the Wabag region, the TPNG Bureau of

. .

/8/

Statistics reported from 7.4 to 14.7 tons per acre per year (from 18.6 to 36.9 t.ha) depending on altitude, slope and soil type.

c) For Raiapu Enga near Wapenamanda (1780 m), Waddell (1972: 117) estimates 18.96 t/ha/year for mounded sweet potato. Unmounded sweet potato yields slightly better at 23.60 t/ha/year.

d) For the Mt Hagen area, a "Survey of Indigenous Agriculture" (TPNG Dept. of Agriculture?) reports that 48% of a maximum yield of 24 tons per acre is harvestable within 12 months of planting. This would equal 28.9 h/ha/year.

e) For the Kamu Valley (Kapauku) people in West New Guinea, Pospisil (1963: 444) reports from 730 to 1520 kg per 900 m², depending upon cultivation technique. The least laborious technique consists of a simple extensive shifting cultivation without any preparation of the soil, producing the equivalent of 8.13 t/ha during a period of eight months. The most laborious technique involves a complete working of the soil and preparation of raised and ditched beds (Kapauku *bedamai*), producing the equivalent of 16.9 t/ha/cycle.

Although there are certain ambiguities about the notion of yearly yields per area (see note /8/13 for details), a crude comparison on this basis is still informative:

Huli mondo	1	30.1	t/ha	
Mae Enga mondo	+	18.6	to 36.9 t	:/h
Raiapu Enga mondo		18.96	t/ha	
Raiapu Enga <i>yukusi</i> (unmounded, similar to <i>tse</i>):		23.60	t/ha	
Mt Hagen raised beds:		28.9	t/ha	
Kapauku bedamai:		25.39	t/ha	
Kapauku intensive				
unmounded shifting cultivation:		20.71	t/ha	
Kapauku extensive shifting cultivation:		12.19	t/ha	

The yields for all the intensive techniques involving complete tillage of the soil are thus roughly similar, with a range from 18.6 t/ha for

/8/

/8/

Mae Enga mounds to 36.9 t/ha, again for Mae mounds but in the most fertile soils. Duna yields appear considerably better than Raiapu yields, but not much different from Huli and Kapauku yields, despite the suggestion ' that the latter two systems operate in more fertile soils. The range of yields reported for the less intensive systems of cultivation show greater variation and require further examination. The Duna tse yields are much the same as yields from Kapauku extensive shifting cultivation, but the Raiapu yukusi yields are greater than Raiapu mondo. Raiapu yukusi plots are in fact more intensively cultivated than Duna tse, since the soil is completely broken up, but only little mounds .45 m in diameter and without any composting are Waddell offers no explanation for the greater yield of yukusi formed. compared with Raiapu mondo, and it is at first puzzling why 80% of the Raiapu field system should be devoted to the more laborious and less productive mondo and only 20% to yukusi. One factor may be the greater frost-resistance of the mondo system. Another factor may have to do with the nitrogen and phosphate levels in gardens newly cleared from fallow (referred to above as a possible explanation of the low yield of Duna mounds in pioneer sites). Yukusi are mostly cleared from grass fallows (unlike Duna tse which are mostly established in forest plots), and it may be that these soils have higher nutrient levels than forest soils rich in raw organic matter. By this theory, the initial high fertility of grass fallow soils soon drops as micro-organisms decompose the remaining organic matter over several yukusi cycles. It then becomes necessary to restore fertility by compost mounding.

With estimates of areas under cultivation and yields per area it is now possible to proceed to calculation of production levels. Table 8:8 calculates the production levels achieved per person¹⁴ in each of three societies, based on the different cultivation cycles in each instance:

1

Table 8:8

Sweet potato production per person per day

	Length of cycle	Area under cultivation per person	Yield/ha/ cycle	Production/ person/day
Duna	(185 days)	.077 ha	13.62 t	5.6 kg
Raiapu	(385 days)	.155 ha	20.06 t	8.1 kg
Kapauku	(243 days)	.095 ha	8.95 t	3.5 kg

The Raiapu Enga and Kapauku yield factors are based on the separate yields of the different methods of sweet potato cultivation in each instance calculated proportionally to the area devoted to each method. The Duna yield factor is for mondo alone, since I do not know the proportion of tse cultivation, although it is in any case very small. Seen in this perspective the original estimates of areas under cultivation take on new significance. The Kapauku, who at first sight cultivated more than the Duna, actually produce considerably less sweet potato - due to the low overall yield factor for their cultivations (which are mostly of the extensive, unprepared soil type) and the slightly longer length of their cycle. Likewise, although the Duna do not produce as much sweet potato as the Raiapu, they nevertheless produce more than would be expected on the basis of areas under cultivation, with the Raiapu cultivating twice as much ground per person as the Duna. The three societies can be ranked in order of sweet potato production or of land under cultivation, but the two rankings will not be the same, nor is either a direct index of intensity. Nor is the yield factor a direct index, since it is a product of the interaction of human labour and skill with differing environments. In order to distinguish the separate contributions of labour and environment it will be necessary to consider the amount of labour expended in each society in reaching observed production levels. Before doing this I shall first turn to the other side of the production process in these societies, the cycle of consumption of sweet potato represented by the needs of pigs and humans. In doing so, one comes closer to the native appreciation of what sweet potato production really is, not an end in itself but a means of producing pigs and

feeding people. Unlike the yam-growing peoples of the Sepik or the Trobriand Islands, for example (Tuzin 1972; Malinowski 1935),

A

Highlanders do not produce their sweet potato surpluses out of any ceremonial or sentimental interest in the tubers themselves. Ceremony and sentiment are reserved for pigs.

137.

/8/

Since pigs do not return to their homestead until near nightfall, and since I had neither time nor inclination to spend a night in turn at each Horailenda homestead, I decided to settle for an estimate of pig population based on the simple expedient of asking each homestead head how many pigs were at his homestead, regardless of ownership. (Most pigs are owned by their keepers, although some are agisted).¹

In my two surveys I enquired about pigs in somewhat different and not altogether comparable terms, using European (English-language equivalent) categories the first time and Duna categories for pigs by their size in the later survey. The results were as follows:

Pigs at Duna homesteads, Horailenda

Table 9:1

	1			
1970	-number of homeste	ads: 77	1972 - number of homesteads: 78	
*	SOWS	108	dange (over 50 kg) 98	
	gilts, barrows and boars	21	pakala (over 30 kg) 52	
	piglets	237	kulini (around 20 kg) and itsia ketse.	
			"piglets" <u>176</u>	
	total	366	total 326	

The average of both surveys is 346. The average per homestead is 4.5, with a range from 0 to 18 and a standard deviation of 3.44. The average per person is 1.02.

I am unable to attribute the decline in numbers between the two surveys to any particular cause. Since there are no planned pig cycles in Duna country, it is difficult to estimate what relation these. figures might have to long term averages or periodic minimums and maximums. However, there had been many deaths in the Horaile' pig herd during 1969 (apparently due to pneumonia) and everyone agreed that "there were many more pigs here in the old days". Moreover, since Duna pig production in the past had a great deal to do with the politicaleconomic functions of lineages as war-financing and indemnity-paying groups, there is good reason to suppose that the pig population was higher in the days before these functions lapsed.

139.

In order to arrive at an estimate which would more accurately reflect the consumption requirements of Horailenda's pig population, I combined the figures for *kulini* and piglets into "standard pig units". I estimate that the average adult Horaile' pig weighs around 60 kg. (Duna apparently slaughter their pigs sooner than Enga and Hagen people — but little in the way of published data on this point is available.) In the absence of any more accurate data, I further assumed that whenever a man reported having five or more *kulini* that their average weight would be 10 kg each, while four or less *kulini* were assumed to weigh 16 kg each (supposing that the more small pigs a man reported, the more likely it was that they were younger). On this basis² the average of the two surveys is 186 adults plus standardized juveniles. The average per homestead is 2.4, with a range from 0 to 8.2 and a standard deviation of 1.8. The average number of adult pigs plus standardized juveniles per person is .55.

At the time of my second survey I also enquired into transactions of pigs which each homestead head had been involved in during the past year. While some men had tended more or less the same stock during the period, others had given pigs in transactions or killed some of their pigs for homestead consumption. A number of pigs had died as well, and these were mostly consumed. This combined homestead "output" of pigs was largely independent of the number of pigs reported held, since some men reported high outputs but few pigs held, while others both transacted/consumed and held many pigs, and others again held larger numbers of pigs than they transacted or consumed. The 73 men from whom I obtained data reported transacting or consuming a total of 294 adult and standardized juvenile pigs during a period of approximately one year. The average per homestead was 4.0, with a range from 0 to 16 and a standard deviation of 3.5.

/9/

19/

Finally to further approximate the probable consumption needs of individual homesteads for their pigs I have devised a statistic for each homestead indicating *either* the number of adult and standardized juveniles held (average of both surveys) or one half the number of pigs transacted/consumed, whichever is greater. The assumption here, a rather arbitrary one, is that each pig transacted or killed has been tended for a period of six months. Although it is difficult to

say exactly what reality this "composite statistic" represents, it nevertheless seems a better approximation of consumption needs than average number of pigs held alone, since it provides some correction for those cases where homestead output was clearly higher than would be indicated by the number of pigs which happened to be held at the times of my two surveys. The 73 men from whom I obtained data on this basis tended 225.7 adult and standardized juvenile pigs. The average per homestead was 3.1, with a range from 0 to 8.2 and a standard deviation of 1.89.

To estimate the sweet potato consumption of Horaile' pigs I weighed the pigs' ration at one homestead where there were 2 large sows and 9 piglets over a period of 23 days. I also recorded the rations set aside for 22 pigs in four other homesteads on one day each. The average consumption of all pigs was 2.14 kg per day, while the average consumption of the same pigs reckoned as equivalent to 17 adult and standardized juvenile units was 4.15 kg. It is difficult to evaluate these figures in relation to other reports in the literature since the latter show a wide range of variation. Waddell (1972:118), whose observations are perhaps the most accurate, reports that Raiapu Enga pigs (all sizes) consumed 1.4 kg of sweet potato and .1 kg of Setaria palmaefolia on average per day. Rappaport (1967:60-61), who also made careful observations, estimated that adult and adolescent Maring pigs were fed 2.6 lbs. per day of tubers and an additional .4 lb of kitchen scraps,³ equivalent to a total of 1.4 kg food per adult and adolescent pig per day. However, his overall consumption figures for all pigs indicate 6674 lbs. of tubers for 3388 pig-days, equivalent to .89 kg tubers per pig day. Both the Enga and the Maring estimates seem low in relation to my Duna estimates. On the other hand, Pospisil (1963:

19/

207) reports that Kapauku pigs (all sizes) receive about 4 kg each per day, while his figures (p. 395) indicate that 31 pigs were fed, 37,200 kg in 240 days, equivalent to 5 kg/pig/day. It thus appears that the average daily ration per pig (all sizes) is about 1.0 kg among the Maring, 1.5 kg among the Raiapu, 2.1 kg among the Duna, and 4 to 5 kg among the Kapauku. It is difficult to decide what part of the apparent variation is due to environmental factors or husbanding practices (e.g. more or less pig food obtained by pigs directly in foraging), what part to differences in the average size of pigs in the different populations, and what part to the inadequacies of observation. For the sake of simplification in subsequent calculations I will assume that the average consumption for pigs of all sizes throughout the Highlands (including Duna) is 2.0 kg. I will also assume that the average consumption in computations involving Duna adult pigs and standardized juvenile units is 4.0 kg/pig/day.

To estimate human sweet potato consumption I have even fewer observations than for pigs. I asked Irari to show me what he would consider a typical daily ration for himself; the harvest or unprepared weight of this ration was 2.0 kg. On another occasion I asked him to show me how much sweet potato he would require for an entire day if there were nothing else to eat; this ration weighed 3.1 kg. Another Horaile' man indicated 1.8 kg of sweet potato as a typical daily ration for himself and his 4 year old son, and a third man indicated 1.8 kg for himself alone for night and morning, saying that he would eat *tsapu* (setaria) at mid-day. Some estimates from the literature are:

Raiapu Enga (Waddell 1972: Fig. 13 and Tables 28 and 29): 1.16 kg (prepared weight) of sweet potato per capita; = 1.84 kg;total diet (prepared weight) Siane (Salisbury 1962:80): 1.9 kg (prepared weight) of sweet potato per adult; total diet (edible portions) = 3.4 kg; Chimbu (Hipsley and Kirk 1965): 1.3 kg (prepared weight) of sweet potato per adult male; total diet (edible portions) = 1.75 kg. Maring (Rappaport 1967 :60): 1.5 kg (unprepared weight) of "root crop tubers" per capita; total diet (unprepared = 2.6 kg; weight) Bomagai (Clarke 1971:179): 0.5 kg (prepared weight) of sweet potato per adult male; total diet (edible = 3.22 kg; portions)

Kapauku (Pospisil 1963:196, 376, 395): 2.89 kg, 1.72 kg and 1.42 kg of (unprepared weight?) root crops per man, woman and child respectively; total diet for adult males = 3.33 kg; per capita per day sweet potato consumption = 1.98 kg.

Waddell shows that 7% of the unprepared weight of Raiapu sweet potato is waste and refuse (presumably not allowing for weight lost in cooking), while Rappaport estimates that edible portions are 80% of the weight of tubers when harvested. If we take 115% of edible portions as an average figure for harvest weight, per capita consumption " of sweet potato by harvest weight can be estimated:

		sweet capit	potato/ a/day		% of total diet edible portions	·,
	Raiapu	1.3	kg		,70.6%	
	Siane	1.7	5 kg		64.3%	
	Chimbu	1.0	kg		87.9%	
	Maring	1.5	kg root cro	ops	57.7%	
14	Bomagai	.4	kg	12	19.1%	
8	Kapauku	2.0	kg	1.	90.0%	
				1		

Table 9:2 Per capita consumption of sweet potato

/9/

That the Raiapu consume less sweet potato than the Siane or Kapauku is expectable, due to their dry season reliance upon yams and Setaria. That the Chimbu consume even less sweet potato, while making it an even larger portion of their total diet, can perhaps best be put down to overpopulation and suggests under-nourishment (see Venkatachalam 1962). The low sweet potato consumption of Maring and Bomagai in relation to their total diet is consistent with what is known of the tendency for low-intensity systems at lower altitudes to offer a more varied diet. The limited data from my Duna informants suggests a consumption pattern not unlike the Siane, that is, around 1.9 to 2,2 kg of unprepared sweet potato per day per adult, or 1.6 to 1.9 kg per capita, with a total diet (edible portions) somewhere between 2.0 and 3.0 kg per capita. For the purpose of calculations I will assume that daily per capita consumption among the Duna is 1.75 kg of sweet potato (harvest weight) and that the total diet can be considered (as a simplification) as equivalent to 3.0 kg (harvest weight) of sweet potato.

With these figures it is now possible to make a check on the earlier estimates of sweet potato production. Since the Duna maintain a herd of one pig per person, the average person's daily consumption needs (considered in simplification, as if in terms of sweet potato alone) are equivalent to 3.0 kg for personal consumption and 2.0 kg for pigs. In Table 8:8 the average daily production per person was estimated at 5.6 kg sweet potato equivalent, or 112% of the daily consumption needs. Assuming that the average per capita and per pig consumption figures among the Raiapu and the Kapauku can be considered to be the same as for the Duna, comparisons on the basis of published information can be made for these systems as well (Table 9:3):

Table 9:3

Sweet potato production and sweet potato consumption, per person per day

A CONTRACTOR OF A CONTRACTOR O	and the second	and the second s	and the stranger of the strang	Alternative and a state of the
* 	Production/ person/ day	Pigs/ person	Total consumption	Production as percentage of consumption
Duna	5.6 kg	1.0	5.0 kg	112%
Raiapu	8.1 kg	2.3*	7.6 kg	107%
Kapauku	3.5 kg	0.17**	3.3 kg	106%

* Waddell 1972:62

** Pospisil 1963:216.

Despite the number of assumptions made in deriving these figures, the final results are similar enough in each instance to suggest that the estimates are reasonably accurate. The estimates of consumption requirements work out to between 89% and 94% of the estimates of total production. The difference between consumption and production may be regarded as a crop surplus, an extra amount above immediate needs which can be left in the ground as a safety margin, used to meet an expansion in the pig population, or exported through trade to less productive neighbours (cf. Hogbin 1951:69; Waddell 1972:118). Pospisil in fact reports that the Kapauku group he studied exported 2.8 t of sweet potato, sold 13.9 t to Pospisil himself,⁵ and imported another 1.3 t. However, neither the Raiapu nor the Duna engaged in more than marginal

19/

1

exports or sales of sweet potato. In any event, it should not be concluded that the Duna produced a larger surplus than the Raiapu or Kapauku; to do so would be to place too much confidence in estimation as a method. In the Duna case certainly, a part of the calculcated surplus is probably estimation error.

There were some indications that the actual Duna (Horailenda) surplus may have been smaller than the calculations suggest. In other parts of Duna country shortages were evidently of common occurrence. On several occasions in parishes along the Strickland I was unable to buy enough sweet potato for the needs of my small line of carriers. Prolonged spells of dry weather were evidently the cause, although on one occasion at Yokona when local people appeared to be emaciated and actually starving, shortages were blamed on destruction of gardens by wild pigs. Supplies of sweet potato at the market held at Lake Kopiago were also often less than the demand (by the predominantly non-local station population), suggesting that the surrounding parishes in the lake basin produced little surplus. In contrast, there were no shortages at Horailenda, at least in the upper part of the parish. Several men consistently cultivated large surpluses which they sold in exchange for pigs to men living in the lower reaches of the territory. On several occasions I discussed the subjects of surplus and shortages with local men. I could discover no term for "famine" other than "we're hungry for sweet potato". In their view, being hungry for sweet potato was a simple consequence of people and pigs eating up existing supplies. They seemed unable to grasp the notion that a shortage might be due to insufficient planting and planning, and they halfheartedly accepted but did not propose themselves that adverse weather conditions could be a factor leading to shortage: "we don't think about the rain or the sun or things like that, it's just that we eat all the sweet potato and then we're hungry".

The relation between production and consumption can also be looked at on a homestead by homestead basis. In Fig. 9:4 I have plotted estimated areas under cultivation per homestead against the composite statistic for number of pigs tended (p.129, above). Visual inspection

191

ha under cultivation



suggests some slight correlation. A stronger correlation emerges in Fig. 9:5 where areas under cultivation are plotted against estimated total consumption needs of each homestead. In estimating consumption needs I have counted adult and adolescent males and also adult and standardized juvenile pig units) as equal to one consumption unit of 4 kg sweet potato equivalent. Adult and adolescent females are counted as .7 consumption unit and children under the apparent age of 15 as .5 unit. The broken line drawn through the scatter plot represents the area required under cultivation at each consumption level, on the basis of the daily production per ha estimate, 73.4 kg/ha/day (= 13.62 t/ha/cycle).

19/

Although there is some correlation between the area each homestead cultivates and its consumption needs (in terms of the numbers of pigs and people supported), there are several cases where large evident surpluses or deficits appear. Kualu and Mbokola appear to have produced more sweet potato than they could consume, while the homesteads of Apuake, Ukundua and Hatsiape evidently produced much less than their requirements. Kualu, whose large gardens included some of the plots at Yuku, had a reputation as a "*mbou anoa*", a "garden man" who specialized in excess production. He sold sweet potatoes to other men (a practice known as "eating another's garden". Hatsiape, on the other hand, reported losing many pigs through sickness, and this would be consistent with underfeeding. Likewise, Karu and his family (also a deficit homestead) were often sick and showed signs of malnutrition. Other factors might have come to light if I had known the production and consumption positions of each homestead while in the field.

/10/ Labour and the Intensification of Production

It is most unfortunate that I made no systematic observations in the field on the labour requirements necessary to achieve the production of sweet potato and, in turn, pigs. In terms of the central problems of this study as it has evolved in the years since leaving the field, those of intensification and the appropriation of surplus labour power, this deficiency seems easily the most serious single shortcoming in the thesis.¹

In the absence of precisely timed and theoretically informed observations of all the activities involved in all parts of the production process among the Duna, I must rely upon my informal observations of garden work taken together with formal observations of gardening operations published in other studies. In Table 10:1 I list the sequence of operations involved during the clearing and first mounding cycle of a typical .5 ha garden in primary forest (regarded by Duna men as the most laborious kind of garden-site). The first operation involves felling trees around the periphery of the garden. Trees are felled on both sides of the eventual fence-line, thereby leaving a cleared margin outside the fence. I assume that a swath 25 m wide is cut. A measured 75 square feet of typical lower montane forest contains six large trees above 75 feet tall (Lea and Irwin, 1967:22, illustration 22); that is, 6 trees for each 75 feet or 25 m of fenceline. Experiments conducted by William Townsend (1969) show that Heve men using stone axes of the same type as formerly employed in Duna country require 1.9 hours to fell trees 50 inches in circumference, a typical size for large trees in lower montane forest. Duna practice is to fell large trees first, since smaller trees of the secondary forest canopy are often carried down with them. I therefore allow little extra time for the felling of smaller trees. In the second operation, fencing, large felled trees are trimmed of their branches and levered into place by one or two men. Each 25 m of fencing would thus contains the six large trees and associated smaller trees felled in the initial One man can construct a run of fence as long as the height clearing.

Operation	Men's labour (hours)	Women's (hours	labour	Assumptions
Felling trees	144		P	72 large trees x 2 hours per tree
Fencing	72	-	1	300 m fence; 1 hr for each of 6 major logs per 25 m section
Pollarding trees	42	-		28 trees x 1.5 hours per tree
Chopping roots and breaking soil	1500	· -		1.5 hours per 5 m ²
Clearing and burning		167	-	10 minutes per 5 m ²
Mounding		675	+	45 minutes per mondo, 1800 mondo/ha
Planting	· · · · ·	210		12 minutes per mondo + 30 minutes obtaining planting material per 15 mondo
Weeding	-	112.	.5	7.5 minutes per mondo
First harvestin	g 45	255	7	20 minutes per mondo
2nd harvesting	22.5	127.	5	10 minutes per mondo
Totals	1825.5	1547.	0	
Grand total	3372.	5 hours (or 6745	hours/ha)

Table 10:1 Estimated time required per .5 ha Duna forest garden - first cycle

*Both men and women plant bananas, taro, marita pandanus and other crops. However the estimates here suppose a garden planted entirely to mounded sweet potato. /10/

of the trees felled (around 25 m) each working day, suggesting that each large log requires an hour to trim and lever into place. However, this is a task normally done by two or three men working together, which results in some greater efficiency. After the work of fencing is completed about half the garden area enclosed by the fence is still forested: On the basis of an assumed 6 large trees per 75 square feet I calculate 28 large trees per .25 ha. Given Townsend's data relating chopping time to the size of trees and branches, I estimate that each tree can be climbed and pollarded in an hour and a half. In the next operation I estimate that each 5 m² of garden area contains ten to twelve roots to be chopped out, each requiring 10 minutes, with an additional 30 minutes required to break up the soft forest soil into large clods with the aid of a sharpened pole. This is the most time-consuming operation in preparing the garden site and most men work at it on and off throughout the year. Some men prefer to do a superficial job of clearing roots, and so proceed to planting of sweet potato tse without any further breaking of the soil. Assuming a complete preparation of the soil prior to mounding, the estimated male labour to this point is 1758 hours, or twice that (3516 hours) per ha.

Women take over the work and begin clearing refuse, burning, mounding and planting. This work can actually begin shortly after the men fell the first trees, although the planting of mounds is usually delayed until the fence is nearly completed.² Women work individually, each in their own demarcated section of garden, burning small heaps of refuse and mounding and planting on succeeding days, so that a small area is mounded and planted before work commences on the next area. As is typical of lower montaine oak forests in the region (Robbins and Pullen 1965:105), the forest floor is often almost bare in the lower Tumbudu except for a few creepers and ferns. The clearing operation therefore requires little work apart from the time required to heap up and burn the tree loppings. For estimates of the time required in mounding, planting and weeding operations I have relied upon Pospisil's (1963:122-25) observations of Kapauku bedamai (raised and composted sweet potato gardens. Kapauku beds are of approximately the same bed) size as Duna mondo (2078 per ha vs 1800) and involve the same sequence of operations. Pospisil timed bedamai work as performed with a wooden

.

/10/

"earth knife", not unlike the wooden spatulas which have nowadays been entirely superseded by steel shovels in Duna country. Direct comparison with Duna mondo seems appropriate except in two respect, the slightly smaller size of *bedamai* and the damper, heavier ground in which they are formed, necessitating shallow ditching. I assume that these two differences cancel each other out. Finally, both mondo and bedamai require little weeding, and for the same reasons: turning of the soil inhibits weed growth and makes the removal of those weeds which do appear much easier. Summing female labour in the production process so far gives an estimated total of 1164.5 hours, or 2329 per ha.

Pospisil's observations indicate that the harvesting of bedamai requires 528 hours per .5 ha.3 Unlike Duna mondo which are usually not broken up until the commencement of the next mounding cycle, bedamai are harvested but once and completely broken in the process. I have assumed that somewhat less labour is involved in the Duna practice and therefore allowed a total of 450 hours per .5 ha for all harvesting. I may, however, be mistaken in this, since probing mounds for tubers with a digging stick may be more time-consuming (although less laborious) than completely demolishing bedamai with an earth knife. In any case, the labor involved in harvesting mondo is further apportioned between men and women on the basis of their different consumption requirements. Assuming that a man harvests one consumption unit for himself alone while a woman in the same period of time typically harvests .7 unit for herself, .5 unit for each of two children, and 4 units for pigs, I estimate that 15% of all harvesting is done by men while women do 85% of harvesting.

Total labour requirements for producing a first-cycle harvest of sweet potato from a .5 ha garden cleared in forest are thus estimated at 1825.5 hours of male labour and 1547.0 hours of female labour, a total of 3372.5 hours or 6745 hours per ha. These estimates of the time spent in various activities confirm my subjective impressions from many untimed observations in Duna gardens. But if it is asked whether this is the amount of labour actually involved, the answer can only be that I do not know. I have here made only a probable estimate,

With an estimate of 6745 hours/ha for Duna mondo gardens cleared in primary forest it is possible to consider labour intensity per area of land on a comparative basis. Pospisil (1963: table 7) provides estimates which can be converted to an hours/ha basis for the three forms of Kapauku cultivation, each of which evidently requires an eight month cycle from beginning of site preparation to final harvest. Kapauku extensive shifting cultivation requires 263.5 hours labour for an average-size garden of 900 m², equivalent to 2927.8 hours/ha. Intensive shifting cultivation likewise requires 3321.1 hours/ha and bedamai requires 5051.1 hours/ha. Waddell (1972: table 23) provides information on Raiapu cultivation, though on an hours/ha/annum basis. Open field cultivation (both mondo and yukusi) requires 4000.0 hours labour per ha per year. Since mounds are last harvested 55 weeks after planting (p.117), it can be computed that the complete mondo cycle requires 4230.8 hours labour/ha. Raiapu mixed gardens have a life-span of around fifteen months (p.50, presumably from beginning of site preparation rather than planting?) and require 6466.1 hours/ha/annum, or 8082.6 hours/ha/cycle.

As an example of extensive cultivation practices at lower altitudes, Rappaport provides data on Maring gardens—in terms of caloric rather than time expenditure. Assuming that on average 2.8 calories per minute are expended in heavy work and 1.5 calories/minute in light work (see Rappaport 1967: table 5 and appendix 5), a total of 5634.1 hours/ha can be computed for an entire cycle in Maring mixed sugarcane/ sweet potato gardens.⁴ The first cycle in a Duna forest garden thus apparently requires more labour than all other systems except Raiapu mixed gardens. This is an expectable finding when it is considered that Raiapu open field cultivations involve no site preparation (due to the practice of continuous cultivation) while Kapauku *bedamai* are prepared in grasslands requiring no felling of trees, and Maring gardens involve no tilling or mounding of the soil. The total labour expended in Raiapu mixed gardens seems high, but includes a staggering 3,459 hours/ ha in clearing and fencing alone (Waddell 1972:96), suggesting the economies of time made possible by Duna clearing and fencing techniques.

These comparisons must be modified however, in view of the semipermanent nature of Duna gardens, intermediate between Raiapu continuous cultivation and land-extensive forms of shfting cultivation. The labour expended in clearing a Duna garden from forest is in effect a capital investment that pays for itself over a number of garden cycles. By comparison Maring gardens, Raiapu mixed gardens and Kapauku extensive shifting cultivations are cropped for a single cycle only. Kapauku intensive shifting cultivations and *bedamai* on the other hand resemble Duna gardens: several crop cycles may follow one another and intensive shifting cultivations are often converted to *bedamai* in the same way that Duna *tse* are usually later reworked into *mondo*.

Estimating the average labour per garden cycle thus depends on the number of cycles between initial site preparation and final abandonment. If an average Duna forest garden passes through six cycles before being abandoned (cf. the above estimate of 3.2 years average life-span for forest and *yango* gardens combined), the average labour per cycle may be calculated as follows: Initial preparation requires 3850 hours/ ha. The first cycle of mounding, planting and harvesting requires 2895 hours/ha, while subsequent cycles probably requires somewhat less time due to the greater ease with which repeatedly worked soils can be remounded (I estimate 2520 hours/cycle). This amounts to a total of 15495 hours, which together with initial preparation time comes to a grand total of 19345 hours for six cycles, or 3224.2 hours per cycle on average.

Estimates can be made on the same basis for the Kapauku systems

of semi-continuous cultivation. If an intensive shifting cultivation garden is considered to pass through an average of four cycles, labour requirements rise from 3321 hours to 7987 hours, equivalent to only 1997 hours/ha/cycle. If *bedamai* cultivations pass through an average of six cycles, total labour requirements become 22046 hours (allowing for reconstruction of the flimsy Kapauku fencing at least once), equivalent to 3674 hours/ha/cycle. Arranged in order of increasing labour per average garden harvest cycle the various systems then compare as follows:

Kapauku intensive shifting cultivation (4 cycles)		1997 hours/ha
Kapauku extensive shifting cultivation (1 cycle)		2928 hours/ha
Duna mondo (6 cycles)		3224 hours/ha
Kapauku bedamai (6 cycles)	:	3674 hours/ha
Raiapu mondo (continuous cycling)		4231 hours/ha
Maring extensive shifting cultivation (1 cycle)	•	5634 hours/ha
Raiapu mixed gardens, extensive		

cultivation (1 cycle)

8083 hours/ha

Seen in this perspective the usual dichotomy between labour intensive and land extensive cultivation practices suddenly disappears. The two most labour-intensive systems are both of the land extensive variety requiring new garden clearings to be made each year. The least laborious system turns out to be the one designated by Pospisil as "intensive shifting cultivation", a system requiring only 68% of the labour per cycle involved in the Kapauku extensive shifting cultivations. The *mondo* and *bedamai* systems, which are land intensive and often presumed to be labour intensive as well, turn out to occupy the middle range of labour intensities per cycle. The large Raiapu mounds require the most labour, Duna mounds the least, and Kapauku raised and ditched beds are intermediate.

To finally arrive at an estimate of per capita labour intensities in each society the labour expended per area under cultivation must be related to the productive efficiency of each system (a product of environmental and technological factors — see Harris's (1971:ch. 10)

"factor of techno-environmental efficiency") and the consumption levels being maintained (a function of more or less constant human consumption plus variable pig consumption depending upon the size of the herd). Alternatively, labour intensity per capita may be arrived at directly on the basis of area under cultivation per capita. I shall consider the productive efficiencies of these systems first, since this is also of interest for the light it may shed on the question of positive inducements for horticultural intensification. /10/

Productive efficiency may be reckoned on the basis of the hours of labour required to produce a tonne of sweet potato, holding area of land constant. To consider the Duna first, one hectare has been estimated to produce 13.62 t sweet potato requiring 3224 hours of labour per gardening cycle. This is equivalent to 237 hours for the production of one tonne. Kapauku extensive shifting cultivation produces 8.13 t/ ha/cycle, so 2928 hours/ha are equal to 360 hours/t. Intensive shifting cultivation requires 1997 hours to produce 13.81 t = 145 hours/t. Bedamai requires 3674 hours to produce 16.93 t = 217 hours/t.⁵ Raiapu mondo sampled by Waddell (1972:117) produced 17.4 t/ha in 47.7 weeks; extended to the full 55 weeks cultivation cycle this equals 20.06 t/ha. Thus, 4231 hours/ha is equivalent to 211 hours/t. Waddell obtained only indirect measurements of the productivity of Raiapu mixed gardens, based on crops harvested by three homesteads over two ten-day periods. Gross yield suggested on this basis was 13.10 t/ha/annum, or 16.37 t/ha per fifteen month garden cycle. But the yield could have been as high as 24.17 t/ha/cycle if the ratio between homestead harvest samples and actual yields was the same as in the case of open field cultivations. These two figures suggest productive efficiencies of 494 hours/t and 334 hours/t (all food crops - mainly yams, sugarcane and bananas) respectively. Rappaport (1967: table 4) indicates a total production of all food crops of 13824.5 pounds per acre in Maring sweet potato/sugarcane gardens. This is equivalent to 15.53 t/ha, giving a productive efficiency of 363 hours/t on the basis of 5634 hours labour. Arranged in order of decreasing efficiency:

Kapauku intensive shifting cultivation	:	145 hours/t
Raiapu mondo	:	211 hours/t
Kapauku bedamai	:	217 hours/t
Duna mondo	:	237 hours/t

Kapauku extensive shifting cultivation: 360 hours/tMaring extensive shifting cultivation: 363 hours/tRaiapu mixed gardens: from 334 to

494 hours/t

/10/

By far the most efficient system is Kapauku intensive shifting cultivation, a system practised in the same grassland environment also employed by the Kapauku for their less efficient bedamai. Yet little more than 1% of the total area of Kapauku sweet potato cultivations are gardened by this method, while the second most efficient Kapauku method, bedamai, accounts for 8.5% and extensive shifting cultivation for the remainder (Pospisil 1963:table 24). Pospisil offers no explanation for this seemingly irrational avoidance of the most efficient methods. Perhaps factors are involved associated with declining soil fertility, similar to those discussed above in relation to the higher productivity of Raiapu yukusi over mondo. By the reasoning in that instance, the apparent efficiency of Kapauku intensive shifting cultivation could well be transitory, declining rapidly after a few cultivation cycles and forcing the cultivator to either abandon the plot or convert it into less efficient bedamai. Possibly too, the small area actually under cultivation by the intensive shifting method has contributed to sampling errors in Pospisil's calculations. Although the method is undoubtedly efficient, it may not be as efficient as his data suggest. The most efficient techniques apart from the puzzling intensive shifting method are the three land-intensive techniques of mondo and bedamai, followed by the three land-extensive techniques. Contrary to speculations by Clarke (1969) and Boserup (1965:41), this evidence strongly suggests that land and labour intensive systems of cultivation are more efficient than simpler techniques of land-extensive shifting cultivation (cf. Brookfield with Hart 1971:90). However, it should not be forgotten that as Clarke noted, a much larger variety of crops are usually grown in extensive shifting cultivations, so that there are compensations for inefficiency. The range of variation between the three intensive systems is small, from 211 to 237 hours/t, and may be a consequence of differences in soil fertility, if there is any reality to these apparent variations at all. On the other hand, the apparent efficiencies of these techniques increases in the same order as the labour input per area, suggesting that in each instance increased labour may be rewarded with increased efficiency. In any case, the evidence so far seems sufficient to warrant a conclusion suggested by Brookfield's initial approach to intensification; intensified horticultural techniques, despite their greater inputs of

labour, offer rewards of greater productive efficiency and so can act as pull-factors in the escalation of horticultural production.

Turning to the estimation of labour intensity per worker, the amount of horticultural labour performed in each society may be calculated on the basis of either areas under cultivation or consumption requirements. The actual calculations necessary to provide these figures are included in note 6. By the first method, area under cultivation, the following figures are reached:

Kapauku	· •	2.27	hours per	worker	per day
Duna		2.3	hours per	worker	per day
Maring		3.1	hours per	worker	per day
Raiapu		4.0	hours per	worker	per day
Calculating by the	second meth	od, c	onsumption	require	ments, gives the
following figures:					
Kapauku	1	2 2	house nor	mankan	non dau

Kapauku	:	2.3	hours	per	worker	per	day
Duna		2.4	hours	per	worker	per	day
Raiapu		3.2	hours	per	worker	per	day
Maring		3.3	hours	per	worker	per	day

The discrepancies are presumably due to the slightly different assumptions involved in arriving at estimates by the two methods. In particular, the rather large discrepancy between the two Raiapu estimates is in large part due to the inclusion of time spent in mixed gardening in the first estimate, while the second estimate is based on an assumption of production as if by mondo practices alone.

Dune and Kapauku both appear to work equally hard, but whereas the Dune are able to support one pig per person with their relatively efficient intensive mondo technique, the Kapauku are only able to support 0.17 pigs per person with their cultivation techniques dominated by extensive shifting gardens. At the time of Pospisi's study the Kapauku group in question was at the low point of its pig cycle⁷; to increase their pig population the work load per worker must increase as well. Again, similar levels of labour input are involved in both the Raiapu and Maring examples. Both communities happened to be at the high

/10

point of their pig cycles, but the Raiapu pig to human ratio is 2.3 to 1 while the Maring ratio is only 0.8 to 1. The difference is accounted for again by the relative efficiencies of the respective cultivation systems. Both groups are presumably approaching the limits of their work capacities, but the inefficient extensive shifting cultivation techniques of the Maring produce far less surplus than the high efficiency Raiapu mondo system.⁸

On consideration, an interesting relationship emerges between productive efficiency and the intensity of production. A gain in productive efficiency can be traded off against either increased leisure time or increased pigs. Thus the Dune with their mondo system (productive efficiency 237 hours/t) have gained an advantage over the Kapauku (overall efficiency of their three systems combined proportionally = 345 hours/t). This advantage could be used to lower the working time per day, but instead it is utilized in increased pig production while the hours of work remain the same. The Raiapu have gained a further efficiency over the Duna (Raiapu mondo = 211 hours/t), and have not only utilized this fully for pig production but have increased their hours per working day as well. It begins to look as if the development of productive efficiency (thinking of these ethnographic examples as a sequence) has been accompanied by an increase in surplus production rather than a decrease in working time.⁹ As efficiency increases the hours of work either remain constant or increase as well.

To investigate this relationship further, the societies considered here can be compared on the basis of work intensity at their peak pigproduction levels. The Maring and Raiapu data already refer to peak levels in their respective pig cycles, although Feacham (1973) indicates that the maximum Raiapu level can be as high as 2.5 pigs per person within the clan territory. Pospisil (1963a:217) says that the pig herd in the community he studied would have been about three times larger at the time of a pig festival, suggesting a ratio of .5 pig/person, but elsewhere (pages 57 and 208) he indicates that a Kapauku village with a population of 125 killed 171 pigs at its festival, suggesting a ratio of 1.5 pigs/person. I have no basis for estimating the maximum number of pigs that might have been maintained in pre-contact Duna

158.

country, but twice the observed ratio does not seem unlikely:

Table 10:2

Estimate of hrs/worker/day at peak of pig cycle

	peak/pig person ratio	productive efficiency	hours/worker day consumption needs
Maring	0.8 : 1	363 hours/t	3.3 hours
Kapauku	0.5 - 1.5 : 1	345 hours/t	2.75 - 4.14 hours
Duna	2.0 : 1 (?)	237 hours/t	3.3 hours
Raiapu	2.5 : 1	211 hours/t	3.4 hours

On the basis of this data it seems that between 3 and 4 hours (determined by the consumption requirement method) may be the maximum working time that can be extracted in these societies so far as peak pig production (and associated peak horticultural production) is/are concerned.¹⁰ Moreover, it appears as if each society at the peak of its pig production utilizes its productive efficiency to the full: historical gains in productive efficiency are, it seems, mostly used to increase production — not to increase leisure.

Here we encounter horticultural intensification in its second sense, not just agricultural intensification of labour inputs per unit of area, but over-all intensification of the entire production system not just relative increases in labour for the sake of greater efficiency, but maintenance or even increase in absolute hours of labour for the sake of ever-increasing production. The problem becomes clearer: since there is no logical requirement that increased productive efficiency be matched with increased production, one is in the realm of human freedom rather than necessity. Yet the choice seems always to be taken in the The answer must have to do with the value of the product to same way. This value can be seen to have two aspects (at least): the producer. one an internal subjective evaluation of the product, and the other the political/economic meaning of the pig in its circulation through social relationships external to the production process.

14

From the first point of view, it is true that Highlanders love pigs, and will choose to invest their energies in pigs in preference to any other activity, at least up to the point where exchange involving other commodities such as shell-wealth begin to compete with interest in pigs. Pigs are arguably the ultimate value in Duna life (cf. the Mae Enga expression, "Pigs are our hearts!" [Meggitt 1974]). A Duna story about the panic caused by a group of airplanes flying in close formation during the war years expresses this nicely. The story is recorded in a Duna literacy primary (Cochrane and Cochrane 1966):

... five airplanes came. All men had very great fear. 'All men will die; we aren't sure', they thought ... Many men also thought the same; now is the time for utterly dying. 'Having eaten only one pig we will die', they thought. So the men, having killed all the pigs, only cooked them over the fire (didn't properly cook them) and ate them. Many other men did the same. Hanging oneself was known. Many men did this. Many many pigs and much sweet potato was eaten. 'Having filled our stomachs we will die', they said.

It is legitimate to ask (though perhaps impossible to answer) how many pigs a Highlander needs. Since both the Kapauku and Maring populations with their relatively low pig:human ratios are apparently adequately nourished, it does not seem that value of the pig can be accounted for on nutritional grounds alone (as argued by Rappaport 1967).11 But in any case, pigs have an emotional or psychological value in addition to their nutritional value. For Duna, the sharing of pig meat, as expressed in a mother cutting a small piece of pork fat into equal portions for her children, or in lines of men co-operating in the butchering of pigs into small strips for equitable distribution (photos. 8a-d) is the epitome of socialized and civilised behaviour. They invariably speak of giving and sharing food, particularly pork, in those contexts where we would speak of love and affection (e.g. the statement that children won't cry for their mothers because their fathers will give them better food). In a society where pork (rather than for example bodily contact, grooming, attachment through proximity or sexuality) functions as the main channel through which socialization is effected it seems likely that people will continue to desire and "need" pigs even when their nutritional requirements have been met. An adequate study of

Y.,
/10/

the libidinal involvement of Highlanders with their pigs has yet to be made. At the very least it would require close observation of motherchild interactions and could only be conducted by a female researcher. While the value of the pig deriving from these primary levels of psychological involvement is undoubtedly important in understanding horticultural intensification my concern in later sections will be limited to emphasizing the meanings and values acquired by pigs in the contexts of the more overt and public affairs of political economy.

160.

2 1 ..

/11/ Knowledge and Production

- 7

In all societies production depends not only on systems of action in the material world, but also on systems of knowledge, held individually or collectively. In primitive societies this knowledge can be seen to incorporate both elements of individual skill and correct understanding of the processes of production, as well as apparently "unscientific" beliefs and practices commonly described as "magical". To complete consideration of the main elements of production I summarize here the Duna concepts of knowledge and purposeful action in relation to the material realm.

At the most specific level are gao, magical spells, by which the uncertain and risky process of pig husbandry is aided, There are also gao for curing, sorcery and counter-sorcery, rain-making and rainpreventing techniques, and communion with/control of the power of auwi. All cults as well as most personal magical procedures have their appropriate gao, without which the efficacy of the procedure cannot be certain. Some gao are learned from fathers and elder brothers, but spells are mostly acquired from nendeke and anoa yane, "friends" and "other men", who teach the spells along with accompanying magical procedures in exchange for payment of net bags, shell wealth, pork and sometimes live pigs. Most relevant to the production process of the many forms of gao are those concerned with health and fertility of pigs. Women, or so men say, know of nothing that can be done for a sick pig, nor have they any magic to make the pigs in their care increase. A young man who wants to be a successful 'pig breeder must seek out an anoa kango, a "wealthy man" of repute whose known successes in breeding demonstrate the effectiveness of his magic. The wealthy man will share with the neophyte his personal stock of palena plants, the ubiquitously magical bog iris, Acorus calamus (Table 11:1). The palena must be successfully transplanted to the young man's garden, protected from accidental contact with women, and its leaves fed to pigs together with the appropriate accompanying gao. For the procedure to be assured of success the spells must be known perfectly, and the new owner of the

Table 11:1 The Palena plant palena pebenane kulumbu palena aka waneme mbulame* pole weliapa* palena pongorale haiyake gone pebenane gone kenolopa aka waneme gone*

these varieties not commonly known at Horaile, possibly up-valley only.

Comments from Dalipa and Irari

kenolopa: "When another man comes and asks to exchange pigs, and after he's gone we realise we've killed one of our biggest pigs for him and taken a little pig in exchange, we know that this man was sniffing kenolopa as he came and so has fouled our thoughts".

At Aiyuguli all of these are used as pig and woman medicine. Half is broken off the root and given to the pigs, half is used as "anoa palena" or "ima palena" ("medicine for men" or "medicine for women"). The leaf is used in either case, the root is left in the ground.

For pig medicine, the leaf is inserted into a tuber and fed to the pig with the appropriate gao. In some cases, when a sow litters the owner will feed the leaf to the pig, and rub the skins of the piglets so they will grow up healthy and fat.

For women, the man rubs the leaf on his belly and chest, and inhales its smell. His wife puts some of the leaf under her pillow and rubs her breast and belly with the leaf and pig fat after she has menstruated and after she has had a child.

"The mission has told us this is rubbish and to lose it. But men still wonder what they should do, the mission says to buy medicine, but what medicine does the white man have for copulation? We don't know and we wonder. It's no good if we copulate and the woman's blood goes inside our intestines and bursts them open". /11/

palena and gao must scrupulously avoid sexual contact with his wife, from the time of her first arrival at his homestead on marriage until ten or twelve months later, when the couple's pig herd should be well established. (Because of the association of pig breeding with the domestic concerns of marriage and sexuality, pig magic is considered inappropriate for transmission within the lineage, between "fathers" and "sons" or "elder brothers" and "younger brothers", all of whom should avoid discussing any topics connected with sex).

Gao belong to a secretive aspect of Duna culture. No one talks openly about magic: everyone denies knowing it; and although the successes of others are sometimes attributed to magic, everyone nowadays says that magical spells and procedures are contrary to Christian practice. On no account would they be known or practiced by oneself. I learned only one spell the whole time I lived in Duna country, a short and poetical abracadabra of nonsense syllables alliterating about the word "ambua", (yellow colour). Everyone I asked said other gao were like this too, completely untranslatable and difficult to learn, requiring nights of sitting up, practicing rote recitation. And although a few men still kept special plots of palena plants (and perhaps, viewing them in a new light as a traditional form of "maratsini", 'medicine' effective without spells, gave some to their pigs) it really did seem that with the coming of mission christianity the gao of the old days was gone and completely forgotten. Not only pig magic, but gao for planting bananas, for revenge against women, for sorcery, and for ritual manipulation of ancestral and forest and - all were lost. So even when men could tell me about the conduct of magical practices, they could suppose that the performance of these magical rituals was now impossible. In their view the traditional gao constituted an encapsulated magical knowledge of the ancestors, like an ignition key to start the engine of ritual practice. The key was now lost, and the break with traditional culture complete. Nevertheless the spirit of magical belief is not completely dead. I was once asked in great confidence whether I didn't know magic for winning football (I never played myself). If the desire for magic is great enough, perhaps new spells will be discovered or invented, or the lost spells of yesterday "remembered". (Is it a

163.

Mana, "custom", "tradition", or instructions of the elders, is knowledge of a less specific kind than gao. Often people say haka mana or anoa mana, "spoken instruction" or "men's ways". Where gao is secret and individual property, mana is overt — the shared customary precepts of the group, of the damene, or of men as a group as against women and children. Mana provides a general statement of the rightful and proper purposes of individual behaviour consistent with the interests of the group. As one man explained:

"Older men, fathers and brothers, they speak mana. They say: 'make a garden, behave yourselves, chop firewood, fetch water.' But children don't listen. They say, 'We'll go travelling about and catching birds; we'll play.' But later, when we grow up, we see that what the older men said was true: 'Argh! We should have listened to our fathers. What about our pandanus now; where is our marita pandanus?'" Men have mana and women do not (at least not in men's view). And while

gao are the property of individuals, mana is representative of the authoritative shared consciousness within the male group, transmitted from fathers to sons:

"My damene (lineage) belongs to me. We follow our father's mana. They say to make a garden or something and we do what they say. In this way we organize our work: we build an anda pirape (men's meeting house) together and we'll go together and fight".

Mana thus brings together notions of patrifilial authority with the direction of productive labour in the interests of the male group.

Finally, more general than mana is kono: "knowledge", "thoughtfulness", both "conscience" and "consciousness", equivalent to Pidgin tingktingk. Kono is human wisdom at its most general, acquired as much from within as a product of individual experience as it is from without, as knowledge learned from others. Kono is spoken as a thing in the belly: "no kono tsakanela paneme, peyape kenda", "my thought in my stomach where does it make itself, I shall see". When a man's thoughts or desires are not clear he says "my thought makes itself two (or many)", "I'm of two (or many) minds".

3

/11/

Kono is good judgement; it is also knowledge of genealogies or of myths, or of the doings of one's kin and ancestors. Although Duna do not always pay attention to wise and knowledgeable men,¹ they respect knowledge and equate it closely with leadership: "That man, he knows so much; he's a big-man for sure!" as Irari said of a genealogy-expert we had been interviewing. And although knowledge does not always tell one what to do, there is a quality of moral consciousness about *kono* as there is about *mana*. Since knowledge of what has been done in the past and proper action based on that knowledge are the ingredients of good judgement, the two concepts overlap. Just as men say that their lineages share a single "blood", so they say they share a single consciousness: "he's not another man, he's of my lineage; he thinks the same as me, our *kono* is truely one".

Kono is contrasted with no knowledge, bad/useless knowledge, and madness (*lulutsaleya*). When asked what women think, men most often reply that women have no thoughts, or that men don't know what women think (because "men talk; women can listen"). Likewise, when it is a question of the motives and intentions of other men (i.e. men of other lineages), Duna usually say: "I don't know what they think, I haven't heard. You'd have to ask them. They're other men; their thoughts are different". But at a still more general level all men, at least all Duna men (because they are finally descended from one common ancestor) share a common *kono*. One of the more widely known Tumbudu Valley stories expresses the basis of this common knowledge of the Duna in the form of a speech made by the hero to the people of Yerunda, the half-Duna, half-Bogaia parish on the edge of the Strickland Gorge. The hero arrives at Yeru' with a cake of salt he has carried in trade from Enga country. He finds the people gathered at a place called Pukuli:

"What are you doing?"

"We're having a feast because a man has died", they said. "But where is the pig?"

"Right here", they said, showing him a young boy who was sitting there with tears running down his face.

"What? You're going to eat him".

"Yes".

5210

"Well, where is this man who has died? Is he here?"

166.

"Yes, look in the coffin", they told this man who came carrying salt. He looked - and, oh mother!, there was a big white sow in the coffin. This man was really angry then. He grabbed his axe and chopped down the coffin scaffolding so that the pig fell out on the ground. All the Yeru' people spat in disgust and fled. In every direction, they ran away. Then this man chopped wood and prepared the pig. He got a bamboo knife and butchered it. He baked the joints and roasted the pork strips over the fire. He got a banana leaf and softened it over the flames. He put roasted pork on the leaf and put some ginger on it and sprinkled it with his salt. He ate some and it was delicious. Then one Yeru' man came back - this man held out the pork to him and he too tried it. Finally everyone came and tried it. Then this man who came with the salt said (pointing to the pork): "So this is man, is it? This is man who makes houses and gardens, who talks, who fights other men and thinks?" Then, turning to the boy who was to be eaten: "And this is pig? Pig, who eats insects in the forest and comes to the house to be given sweet potato?" The Yeru' people said nothing. "You are really crazy (inu tsaleya waiya kononia)! This is man, and this is pig!"

He told them this, he really straightened them out. But they still follow their cannibalistic old ways there at Yeru. It's their mana.

The story is, in effect, a charter-myth for the renunciation of cannibalism. Instead of eating humans (as the Yeru' people are believed to do in a spiritual way through a form of witchcraft, and as other peoples in the country beyond Yerunda have been documented to do in fact — see Barth 1975) the Duna alternative, the alternative in their eyes worthy of thoughtful men, is to eat pigs instead.' At the mythic level, production among the Duna is moral production, production dictated by conscious human purpose to the end of creating a better society, a society in which people eat pigs instead of other people.

What is to be made of these Duna concepts and beliefs as a part of the production process? What is one to think of magical spells and beliefs concerning *auxi*, and of pious tales portraying the eating of pigs as an alternative to the unthinking (*kononia*) madness of cannibalism? Are *gao* and *auxi* stones to be included among the instruments of production, productive because the Duna think they are vital ingredients in the process? Is the production of pigs as an avoidance of eating people to be accepted as a simple instance of labour guided by rational consciousness?

In the previous section it was shown that increasing productive efficiency is consistently used to increase pig production rather than human leisure. It was proposed that the choice between pigs and less work was directed by social considerations, by political economy rather than material necessity. Yet the rationality of the intensification of production, so far as the Duna example is concerned, now appears to rest on more or less irrational notions-irrational to us if not to the Duna. Their ideas about production appear inextricably mixed up with magical procedures and dominated by a rationality decreed by the ancestors. Through mana the ancestors have decreed garden and pig production as the goal of the group, and as auxi they control the fertility which makes continued production possible-on the condition that living men continue to honour their relations with the dead. The social considerations upon which the intensification of production rest thus appear to be as much concerned with magical distortions and illusory connexions between men and their dead ancestral past as with any of the practical concerns of relations among living men. Even the notion that pig production is an alternative to cannibalism rests upon an ancestral logic as much as upon any logic of necessity, for the ancestors are revealed in many Duna myths as cannibals who propitiated auxi by human sacrifice rather than the sacrifice of pigs.

How are we to understand the relationship between material production and these ideas, manifestations of the role of human knowledge and purpose in the process of production which yet appear as illusions and distortions of actually existing relationships among men? In proposing a resolution on the side of materialism of the opposition between ideal and material factors in the production of history, Marx asserted that human consciousness does not shape the conditions of production, but rather the reverse. The mode of production, the way of life imposed upon men by the necessities of existence, determines human consciousness. But these necessities include not only the material factors of production,

168.

but the social relationships that men are obliged to enter into for production as well. By emphasizing the social relations of production as an integral part of material production, Marx believed he was able to explain (and explain away) the daemons, gods, spirits and other illusory accompanyments of material production as consciously grasped by men. If the conditions of production, including the relations of production, are not clearly and rationally understood, then the consciousness that results from those conditions will be a distorted image of reality, in effect, a false consciousness.

For Marx, primal man believed in nature spirits because he failed to understand the material nature of production, but as man increasingly understood nature he fell under the sway of a new misunderstanding, a false consciousness of the relations of production. The cause of this misunderstanding was exploitation. The relations of production developed in society for the conduct of production and distribution came to operate as relations of exploitation and dominance. Because men need to conceal exploitation they fail to achieve a true understanding of their relations of production. Their resulting consciousness is dominated by a new pantheon of deamons and gods in human rather than natural form. Marxian theory locates the real basis of this false consciousness in the form of exploitation characteristic of each mode of production, in the so-called "mode of false appropriation". Relations of false appropriation are relations of appearances, relations of social convention. They concern the social rather than the technical division of labour, the exchangevalue rather than the use-value of products. Marx's theory, therefore, suggests that an examination of the relations of production among the Duna may contribute to an understanding of the role of apparent irrationalities within the forces of production.

Part Three:

a = a

1. .

RELATIONS OF PRODUCTION

It is always the direct relation between the masters of the conditions of production and the direct producers which reveals the innermost secret, the hidden foundation of the entire social edifice ...

- Marx, Capital III, chapter 47

Classes are large groups of people differing from each other by the place they occupy in a historically determined system of social production, by their relation (in most cases fixed and formulated in law) to the means of production, by their role in the social organisation of labour, and, consequently, by the dimensions of the share of social wealth of which they dispose and the mode of acquiring it. Classes are groups of people one of which can appropriate the labour of another owing to the different places they occupy in a definite system of social economy.

- Lenin, Collected Works, Vol. 29, p.421.

We need, in fact, to analyse more closely these kinship relations, for if they determine the places occupied by individuals in production, their rights to land and goods, their obligations in respect of work and gifts, etc., then they function as production-relations ...

- Maurice Godelier (1966:93)

[Women] ... were there in the same way as were the Nuer's cows who were observed but also did not speak.

- E. Ardner (1972:140)

/12/ Theoretical Introduction

The concept of the relations of production lies at the centre of Marxian theory of production and the social formation. Marx's theory, however, refers primarily to capitalist social formations. In seeking to generalize Marx's theory to other social formations, recent theorists (Balibar 1968, Hindess and Hirst 1975) have emphasized the mode of production as a more global concept, founded upon the articulation of the relations of production with the forces of production at the economic level. Althusser (1968) and others have made it clear that Marx did not intend his theory of capitalism as a theoretical model of the system of economic production in England. The object of Marx's theory is not England, but the capitalist mode of production itself (see Marx's *Preface* to the first German edition of *Capital I*).

To understand production among the Duna in the way that Marx understood English capitalism, it would be an error to suppose that the object of the exercise consisted in a theoretical model of Duna production. Rather, the aim is to construct a concept of a mode of production, a particular mode, the operation of which can be seen in the illustrative example provided by the Duna ethnography. Marx perhaps faced a less difficult problem, for the existence of capitalism as a mode of production was recognised long before he set himself the task of unravelling its inner workings. With other social formations, and particularly with the so-called "primitive" social formations (by which we may understand those formations characterized by the absence of a state and the presence of pervasive social relations structured on principles of kinship), even a preliminary and largely intuitive notion of the mode of production is uncertain.

As a starting point, we can consider anthropologically-derived theories of primitive modes of production. This involves a review of a number of theoretical proposals for "primitive" modes of production that have been advanced both from within anthropological circles and by marxian scholars with an interest in pre-capitalist formations. An overview of

28

these proposals will indicate more clearly in what respect the identification of "primitive" modes of production lies in an area of uncertainty.

The first of these proposals is that designated by Sahlins (1971, 1972) as the domestic mode of production, or DMP for short. Recognizing that the initial problem of thinking the mode of production for any society is the problem of identifying those structures (or economic forms) which exercise dominant and determinate effects over the material production of the means of life and hence, ultimately, over the reproduction of the entire social formation, Sahlins proposes that the structural unit that performs these functions in most (if not all) primitive economies is the domestic group. The mode of production in primitive societies is the mode characteristic of the forces and relations of production within domestic groups:

Economy is rather a function of the society than a structure [in itself], for the armature of the economic process is provided by groups classically conceived "noneconomic". In particular, production is instituted by domestic groups, these ordinarily ordered as families of one kind or another. The household is to the tribal economy as the manor to the medieval economy or the corporation to modern capitalism: each is the dominant production-institution of its time. Each represents, moreover, a determinate mode of production, with an appropriate technology and division of labor, a characteristic economic objective or finality, specific forms of property, definite social and exchange relations between producing units — and contradictions all its own.

... The household is as such charged with production, with the deployment and use of labor-power, with the determination of the economic objective. Its own inner relations, as between husband and wife, parent and child, are the principal relations of production in society ... How labor is to be expended, the terms and products of its activity, are in the main domestic decisions. And these decisions are taken primarily with a view towards domestic contentment. Production is geared to the family's customary requirements. Production is for the benefit of the producers (Sahlins 1972:76-7).

The domestic group is presented as the primary locus of the relations of production in primitive social formations, and the DMP as "a widespread and profound structure of the economies in question" (Sahlins 1972:74). Sahlins is aware, however, that organizational forms

/12/

more inclusive than the domestic group (e.g. lineages, villages) also have an effect upon the mode of production in primitive societies. Indeed, they must have an effect, "because unless the domestic economy is forced beyond itself the entire society does not survive. Economically, primitive society is founded on an anti-society"(p.86). That is to say, in every society there must be some production (and corresponding relations of distribution) geared to wider societal needs than those represented by the internal requirements of the various domestic units alone. At a minimum, the more efficient domestic units in a society must be induced to produce a surplus for redistribution to less fortunate units, those unable to provide for their own subsistence due to laziness, bad planning or bad luck. More generally, there must be production for the purpose of exchange between units as a minimal condition for the linking of units together into a wider form of sociality. If the DMP is uninfluenced by wider social institutions it can only lead to an anarchic dispersal of the production units, i.e. Sahlin's vision of the "anti-society".

172.

Sahlins provides a quantified empirical basis for his assumption that domestic units tend to gear their production to their own internal needs. Deriving his methods from the work of the agronomist-economist A.V.Chayanov (1966), Sahlins tabulates the work-intensity of actual domestic groups against their consumption requirements. In a study of work inputs and production outputs among pre-revolution Russian peasant families, Chayanov had found that the greater a household's work capacity was, the less its members actually worked. The explanation of this phenomenon would seem to be that all peasant households aim to produce an equivalent standard of living. Since households vary in the number of workers relative to dependent non-workers, it follows that some households are potentially more productive than others. But because work efforts within each household are adjusted to produce equivalent per capita levels of consumption, the result is that workers in labourdeficient households must work harder, while workers in labour-rich households are able to work less. Sahlins generalized this reasoning into a theoretical proposition which he named "Chayanov's Rule":

Intensity of labour in a system of domestic production for use varies inversely with the relative working capacity of the producing unit (1972:91).

Drawing upon ethnographic reports, Sahlins applies Chayanov's Rule to consideration of a number of primitive economies. As an example, in figure 12:1 I reproduce Sahlins' graphic analysis of labour-intensity and domestic consumption requirements in twenty Mazulu (Valley Tonga, Rhodesia) households. Each dot represents the intensity of horticultural labor per worker within each household, plotted against that household's ratio of consumers to workers. Slope C represents the intensity of labor within each household that would be expected from Chayanov's Rule. It is based on Sahlins' estimate that each Mazulu consumer (adult male standard) will require 1.43 acres under cultivation for normal subsistence. Slope I represents the empirical slope of mean actual labourintensity, computed as a linear regression. It indicates that the average area under cultivation per worker increases by 0.52 acres for each 1.00 consumers/worker. This is considerably less than the amount required for subsistence. The Mazulu community is only able to survive as a whole because some households in fact produce a domestic surplus. This is redistributed (presumably by mechanisms based on kinship relations) to those households with a domestic deficit. The encircled point M, the point of mean household composition, lies just below the Chayanov slope, suggesting that the community as a whole has no surplus production above the consumption needs of its members - at least on the basis of Sahlins' estimations. In summary, Sahlins suggests that "the positioning of these lines, their manner of intersection within the range of known domestic variations, makes a profile specific to [each] community of the societal transformation of domestic production" (1972:111). Chayanov's Rule holds in a general sort of way: the more consumers per worker in a household, the harder the workers actually work. But the empirical slope reveals that production is not governed by domestic considerations alone. Households with less than average numbers of consumers per worker tend to produce more than their needs, while households with more than average consumers/worker tend to produce less than their needs. The empirical slope reveals the necessary existence of a social system of production and distribution wider than the DMP.



Figure 12:1

and the second a second provide the provident of the

1 . . . Vien and application of the second

• ***

Chayanov and empirical slopes of labourintensity, Mazulu village. After Sahlins 1972:figure 3.2

12 h 1 c 4-

174.

Sahlins concludes that the analysis of production profiles represents only the first step in the anthropological task of understanding production in primitive societies. The real problem is to interpret specific profiles in social terms. In general, Sahlins suggests, the influences which are exerted upon household production to deflect it from the course of Chayanov's slope are influences originating from kinship and political structures. Kinship structures integrate household economies within communities, facilitating redistribution. Political structures exert pressure on household production units to produce an absolute social surplus, to work harder than they need for themselves, so that an excess can be syphoned off and converted into political power and prestige. And no society can long exist in which the domestic units are uninfluenced by these wider structures. Thus, although Sahlins employs a marxian vocabulary, the domestic mode of production is, properly speaking, a misnomer. Sahlins' concept of domestic mode of production breaks off the analysis at the point where a sociological analysis should begin. The value of Sahlins' concept lies in the emphasis it places upon relations of kinship within domestic units as the primary relations of production in primitive societies. But these relations must always be off-set by external kinship and political relations which, Sahlins notes (p.82), are also relations of production. The domestic mode of production as such cannot be dominant in any social formation. Rather, it appears as an underlying and anti-social structure which must be dominated by other relations of production, relations external to domestic units. Sahlins emphasized the DMP because it appears to be universal in all primitive societies.¹ Production by and for domestic units poses the common problem of economic anarchy to which all societies must find solutions, but these solutions are apparently manifold. Different societies adopt differing combinations of kinship and political relations to overcome the DMP, and Sahlins seems content to leave the specification of particular solutions to empirical analysis alone. Thus, the concept DMP provides a starting point for an understanding of relations of production in societies where domestic groups are primarily responsible for production (e.g. Duna society), but it does not offer any theoretical means of understanding the articulation of domestic relations with wider kinship and political relations of production.

An analysis which attempts to meet this difficulty head-on is provided by Terray (1969) in his essay on "Historical Materialism and Segmentary Lineage-Based Societies". Terray's analysis is based on a single case, that of the Guro of the Ivory Coast,² but as his title indicates, it is intended that the example be generalizable to other segmentary societies. It is therefore an analysis which should be relevant to the problem of mode of production among the Duna.

176.

The Guro are a people of Senegambian origin who have migrated into their present tropical forest surroundings from the savanna regions of the Sudan. They brought with them a number of Sudanic crops, but their importance in the subsistence economy declined in the new environment, while hunting continued to offer an attractive alternative in terms of energy returns (Murdock 1959). The most important form of hunting involves the use of large nets and requires the assistance of all the men of a village. The nets and the hunting grounds are the collective property of the village, which is in turn composed of a number of more or less distantly related lineages. Terray characterizes the mode of production involved in net hunting as based upon "tribalvillage" relations of production, collective ownership of the means of production, and egalitarian distribution of the product. But a second mode of subsistence, based upon the cultivation of Arab-introduced rice, has risen into prominence as the most important productive activity of the Guro during this century. The production of rice, and its ownership and distribution, is organized among the Guro according to principles different from those involved in hunting. Ownership of agricultural land is organized on a lineage rather than a village basis. Likewise, the harvest is stored in lineage graneries and distributed throughout the year by lineage elders. As different principles are involved, Terray proposes that agriculture represents a mode of production separate from hunting.

The Guro social formation then comprises not a single, unitary mode of production involving the application of common principles to different spheres of production activity, but rather a combination of two modes. The hunting mode is based upon relations of production which are also relations of common residence within the village, while the agricultural mode appears to be based on relations of membership in kinship groups, the lineages of the segmentary system. Here, however, Terray follows Meillassoux in arguing that kinship relations in actuality provide only the genealogical raw materials which are then modified and re-organized by technological and economic constraints in order to produce effective production units. "The genealogical relations are the ceaselessly modified and ceaselessly renewed terrain on which the relations of production are built" (Meillassoux 1964:168). Terray, like other Marxists, tends to denigrate the importance attached to kinship by traditional social anthropologists. Nevertheless, he designates the agricultural mode of production as a mode in which the relations of production are "realized" within the lineage system, since it is the actual lineages (however much they may be genealogical fabrications) which are the units of co-operation in agricultural production.

In contrast to Sahlins, Terray's approach emphasizes larger collectivities (the lineage, the village) rather than the domestic units which compose them." Where Sahlins' DMP focuses on the determination of production by domestic needs, the lineage- and village-based modes of production in Terray's analysis automatically assume a redistribution of the product within larger units. There is a difficulty, however, for although the notion of lineage-based mode of production seems applicable in principle to any society where surplus is redistributed among various component domestic units, the particular arrangements of production and distribution among the Guro are in fact ideally suited to the theory. Among the Guro, the family appears to be a weak structural unit, and agricultural production is organized by means of lineage work-teams rather than by family groups. Moreover, the Guro economy is subject to the conditions of a seasonal cycle, such that the harvest of one season must be stored and redistributed to the cultivators during the following planting season. This storage and redistribution readily lends itself to control by lineage elders and no doubt has much to do with the organization of labour under their guidance as well. In contrast, the conditions of production and distribution in New Guinea Highlands economies do not fit the theory of lineage-based production so neatly. Seasonality has much less effect

4

- Her . . .

de

and harvesting can be more or less continuous with the productive effort required for the next horticultural cycle. Sweet potato does not readily lend itself to storage, so there is neither likelihood nor need for an over-all direction of production at the lineage level. Unlike the Guro, domestic groups in most Highlands societies approximate much more closely to the anti-societal ideal of Sahlins' concept. Each family or homestead group tends to be self-subsistent, to organize its production and day-to-day consumption for itself. The basis for lineage co-operation in Highlands societies appears much more problematic than among the Guro.

Leaving this difficulty aside, what does the notion of a lineagebased mode of production contribute to an understanding of the production process and the factors determining it? Although Terray avoids using the phrase "primitive communism", it seems that in his view the lineage as a structural unit represents the common and undivided interests of all its members. Land and the other means of production are communal property, labour is organized on a communal basis, and production is carried out for the requirements of the lineage as a whole. A lineagebased mode of production appears to be a domestic mode of production merely carried out at a more inclusive structural level. The relations of production within the lineage are effectively the same as those within the family, just as the lineage itself may be seen as a large family:

... work-teams and production communities take the form of extended families and segments of lineages or entire lineages — that is, of kinship groups. In the same way, the relation between elder and junior [the basic relation of dominance and subordination among the Guro, through which the organization of production is directed] links related persons: a "father" and his "children", a "big brother" and his "little brothers". [That is to say, the relations of production are realized in classificatory relations of kinship which extend throughout the lineage the same relationships prevailing within the family on the basis of actual relations]. Thus the lineage system appears as a determined totality of kinship relations (Terray 1969:139).

If the lineage-based mode of production is effectively an extended version of the domestic mode of production, the objections raised against

-10.

the latter concept may be considered again. The first objection to the DMP, that it describes a mode of production appropriate only to an anti-society, is now readily overcome. A lineage, by linking together a number of domestic units into a larger economic entity, overcomes the tendency of the units towards anarchic dispersal. If the lineage is endogamous it may even be considered as a society in miniature, containing all the elements necessary for self-subsistent production and its own reproduction. In the lineage-based mode of production economic anarchy is transferred to the level of relations between lineages (although in actual cases these relations are almost always determined to some extent by marital and commodity exchanges).

A second objection to the DMP, that it fails to define the mechanism of appropriation of surplus labor, poses a more difficult problem for the lineage-based mode of production, particularly in the Guro example. Although Terray does not focus on the problems of household redistribution highlighted by an analysis such as Sahlins' Mazulu example, it is clear that such a redistribution takes place; indeed, that it is a necessary condition of lineage-based production where the relations of distribution and consumption must follow from the communal relations of ownership and production. Among the Guro, the harvest is stored in community granaries controlled by the lineage elder, who redistributes most if not all of it back to the direct producers in the following agricultural cycle:

... the collective meal can be seen as the end result of the process of agricultural cooperation: the unspecified labor of each is returned in a common product. All have mixed their labor and all participate in the use of the product of the labor of all the others (Meillassoux 1964: 124-25).

Since individual households do not function as production units among the Guro, individual domestic surpluses or deficits do not appear. Even if it were otherwise, the several surpluses and deficits would automatically be submerged in the complete transfer of harvests to the communal granary. As it is, differences in the productive efficiency of individuals, or of some work-teams relative to others, are lost in the process of communal storage and redistribution. Communal storage and

179.

mode of production would seem to conform to Marx's general principles of communist production and distribution: "From each according to his ability, to each according to his needs" (Critique of the Gotha Programme).

The difficulty with this interpretation arises in respect of the central position of the elders as controllers of the product and directors of the organization of labour. Does not this central position of control, backed by institutionalized authority and prestige, provide the elders with a unique position of power and therefore a basis for exploitation? This question is crucial to the entire analysis, for it is the basic proposition of Marxists that relations of exploitation, where they are a structural feature of the production process, indicate the existence of economic classes and hence the existence of a mode of production founded upon class-based differences of inequality. If the Guro elders occupy a structural position of exploitation, then they would constitute a separate economic class within the lineage. The apparent unity of common interests within the lineage would be shattered. Production would not be for the benefit of the lineage as a whole, but rather for the primary benefit of the elders and the secondary benefit of the others-to the degree that it suits the elders or to the degree that the others are able to demand it.

Terray recognizes the seriousness of this difficulty and devotes considerable space to a refutation of the suggestion by Dupré and Rey (in an unpublished paper) that the Guro elders are indeed exploiters. Dupré and Rey define the conditions of exploitation as operating wherever

... one particular group controls the circulation of a surplus product in such a way that the circulation of this surplus product ensures the reproduction of relations of dependence between the direct producers and this particular group (quoted by Terray, p.167).

In the case of the Guro, not only did the elders control the harvests, but they control as well the wealth-items necessary for the acquisition of brides, thereby assuring the dependent status of the unmarried juniors.

Terray opens his refutation by raising several objections:

The first thing to be said here is that if class antagonisms exist even in lineage-based and segmentary societies, then they are practically universal: only the bands of hunting and gathering pygmies and Nambikwara would be free of them. But in these circumstances the concept of class loses all its power to discriminate between societies, and describes so many heterogeneous forms of reality that it loses all operational value: ... it is difficult to put into the same category juniors who are all destined to become elders by the normal operation of the social structure and serfs or proletarians who ... were never to become lords or employers. Moreover, if lineage-based and segmentary societies are to be regarded as class societies, either the correlation between the existence of classes and that of the state established by Marx and Engels must be rejected, or else the institutions which together constitute the state ... must be discovered in these societies ... (p.167).

A reply to these objections may be formulated in the following terms: it may indeed be the case that all but hunting/gathering societies are characterized by some degree of class-like antagonisms within the kinship order. Since class structures rest upon the appropriation and differential allocation of surplus production, and since it is only with the advent of systems of horticultural and agricultural production that accumulation of surplus becomes possible, this does not seem an implausable hypothesis." On this hypothesis, the presence of exploitative relationships in primitive societies would correspond to the division of these societies into those in which food is produced (horticultural and agricultural societies) and those in which there is no food production (hunting/gathering societies), a division corresponding to Morgan's distinction between the epochs of "barbarism" and "savagery". Such a division would hardly represent a loss of discrimination. Nor would it require a lumping together of antagonistic kinship relations of the elder/junior variety with class relations of the capitalist/proletarian variety, since it is indeed

correct that juniors become elders through the normal operation of the kinship structure. Rather, it is necessary to recognize a discrimination of societies into non-antagonistic and antagonistic formations in which the latter are further subdivided into kinshipantagonistic and class-antagonistic formations. On this basis there would be no need to reject the correlation between the existence of classes and the state. There would, however, be grounds for expecting the existence of juridico-political institutions within lineage structures performing functions analogous to those of the state in class formations, that is, functions of regulating and representing the antagonistic interests of the different groupings within the lineage, primarily those based on sex, age and generation.

Turning to Terray's more substantive objections to the thesis of exploitation among the Guro, his arguments consider in turn the two separate aspects of the social formation within which exploitation could conceivably take place, the process of production and the process of reproduction. With respect to productive activity, Terray adopts a suggestion of Meillassoux's: as it is in the nature of rice cultivation and the seasonal cycle that the cultivators must subsist on the previous season's harvest until present crops come into production, arrangements for storage and redistribution must necessarily be instituted. In this necessity Meillassoux located the conditions which give rise to the authority of the elders and the Guro ideology of kinship in general: Someone has to regulate the distribution of the harvest and coordinate the efforts of work-teams, and it is out of this necessity that the functional position occupied by the elders arises. The elders' position is not a consequence of their power and prestige, but the other way around — their authority is due to the functional necessity of such a position. That it is always elders who occupy this position is explained by their superior knowledge: only the old men of the community have enough experience to reliably perform the functions of the position. In any case, Terray adds, the elders do not appropriate the harvest for their own use but redistribute it back to the direct producers.

182.

with respect to the elders' control over the reproduction of the social structure, the case for exploitation appears much stronger. Meillassoux and Terray accept the proposition of Morgan and Engels that human labour power is the only form of power available in technologically undeveloped societies and that, therefore, control over the reproduction of human beings has a central significance in these societies: "the reproduction of the social and economic structure largely depends upon the conditions under which the physical reproduction of the group takes place ... " (Terray, p.163). Among the Guro, physical reproduction is dependent upon exchanges of women between exogamous communities. These exchanges are made possible through the institution of bride-price, by which wealth received in exchange for a woman of the community is used at a later date to obtain a wife from another community. "Wealth", writes Meillassoux (p.91), "derived from the social organization of the economy, makes marriage possible, and is used by those who have it to perpetuate that very organisation". Since wealth among the Guro (consisting of cattle, iron bars, loincloths, etc.) is not ordinarily obtainable by juniors and is mostly concentrated in the hands of the elders, it follows that the elders can and do control the circulation of women. Since women represent both labour power and reproductive power, the elders' control over marriage means that they are doubly able to control the processes which reproduce the entire social formation and ensure their position of control within it. Since Guro wealth is clearly a form of surplus product controlled by the elders, the case for exploitation (cf. Dupré and Rey's definition) appears made.

Terray, however, advances two objections. First, that since the position of the elders is functionally necessary with respect to the control of the means of production—a necessity which implies no exploitation—"it seems ... probable that it also implies the existence of a controller of the distribution of labor power" (p.174). And secondly, since the elders do not appropriate all wives for themselves but instead marry most of them to the juniors, thereby giving them the chance to become elders in their turn, their control over the circulation of women represents an emancipation from dependence for the juniors, not a reproduction of their conditions of dependence.

None of Terray's substantive objections to the thesis of exploitation appear entirely convincing. With regard to the supposedly tunctional necessity of a position of controller of production, it appears sufficient to note that the Iban of Borneo carry out seasonal rice production without any central functionary, entirely on the basis of an independent storage and redistribution of the harvest within autonomous domestic households (Freeman 1970). Even if the need for a functionary is accepted, little evidence has been given for the limitation of this position to elders. Why are more experienced juniors unable to fill this position? Even more tellingly, why does Terray say nothing of the possibility of mature women filling the position? And as for the argument that the elders' control of the circulation of women does not amount to a reproduction of the conditions of dependency, it might as well be argued that the capitalist's profits represent no exploitation, since they are re-invested to keep the capitalist system of production going, thereby giving other men a chance to become capitalists in turn! Surely the point is that although individual juniors become elders through marriage, the retention of economic power in the hands of the elders is perpetuated, and with it the dependence of future generations of juniors who must labour under the direction of future elders if they wish to obtain wives in the course of time. The only argument remaining to Terray seems to be that the elders are not exploiters becuase in due course they return to the juniors everything that they appropriate from them. But as Dupré and Rey insist, explotation consists in the control of surplus product to reproduce relations of dependency. Exploitation may be accompanied by an unequal allocation of the surplus, but unequal allocation is not necessary for exploitation to take place.

At the risk of going beyond what is immediately necessary for analysis of production among the Duna, the critical commentary on Meillassoux and Terray's notions of mode of production by Marxist theoreticians Hindess and Hirst (1975) must be briefly considered. (I do so lest theoretically-minded readers familiar with their arguments should suppose that my project here, the formulation of the concept of a mode of production by proceeding inductively from a particular ethnographic case, is theoretically inadmissable and mistaken from the outset).

Hindess and Hirst reject the notion of a lineage-based mode of production (and, for that matter, of any other notion of a mode which begins with a structural unit of production) and propose instead that there is a universal "primitive communist mode of production" which is (presumably, since they are silent on this point) theoretically appropriate to all primitive societies. Their reasons in this are entirely theoretical. For them, a "mode of production" is a theoretical entity of Marxist science, an entity consisting of an articulated combination of forces and relations of production in which the relations of production, as a theoretical necessity, are always in dominance (Hindess and Hirst 1975:11). The theoretical necessity for the dominance of relations of production derives from the crucial position of the concept of mode of appropriation of surplus-labour in their theory. Within their theory, a mode of production as a valid theoretical entity can only be established by beginning with a proposed mode of appropriation of surplus and defining a set of productive relations for that mode, from which a corresponding set of productive forces can be deduced (p.68).5 Where a determinate set of productive forces cannot be deduced from the relations of production, the corresponding mode of appropriation "... does not belong to any mode of production and cannot define a set of relations of production" (p.69). In other words, the concepts of the

relations and forces of production "... cannot be defined independently of the concept of the mode of production in which they are combined" (p.68). The notion of a lineage-based mode of production, in their view, cannot be a Marxist concept, since it is based on independent conceptions of either or both the relations and the forces of production. Terray, for example, identifies a separate mode of production for each form of productive cooperation in Guro society. Hindess and Hirst denigrate this procedure as a merely "technicist" notion of the mode of production, a theoretical error of the first magnitude:

... any attempt to identify the forces of production or the relations of production in a given society in the absence of an elaborated concept of mode of production must be doomed to empiricism. Both Dupré and Rey and Terray and Meillassoux fall into precisely this error. In both cases their empiricism is a necessary result of the attempt to study a given social formation in the absence of concepts defined at the appropriate theoretical level (p.69).

By their own example it seems that correct theoretical procedure should begin with one or another of the various modes of appropriation of surplus-labour suggested in the writings of Marx and Engels. Thus, in elaborating the concept of mode of production in primitive societies, Hindess and Hirst baldly announce at the outset that the mode of appropriation is based on communal redistribution of the product. They recognize two variants: simple redistribution in which the relations of production are established only on a temporary basis, and complex redistribution, in which the relations of production are more permanent. They observe that these two variants predominate in Morgan's epochs of savagery and barbarism, respectively (p.58). The Nambikwara and the Guro are offered as two illustrative examples, with the covert implication that whatever is theoretically correct in relation to these examples will suffice for all other possible examples as well. By theory alone, then, primitive modes of production must be communistic. And since communism cannot be exploitative, theory alone proves that the Guro elders are not exploiters: "The control by the elders over the conditions of labour and over certain of the conditions of reproduction of the productive community is a necessary effect of the dominance of the complex redistribution variant of the primitive communist mechanism of

186.

appropriation of surplus-labour" (p.67). Their authority and power is, as Terray argued, a consequence of a functional necessity; but while Terray arrived at correct conclusions from a position of theoretical error, Hindess and Hirst arrive at the same conclusions from a "correct" Marxist position.

It is difficult to offer a brief refutation of this argument. It can be pointed out, however, that Hindess and Hirst do not explain why their emphasis upon the mode of appropriation of surplus-labour should not lead them into the same empiricist errors which they see as the inevitable outcome of any approach which begins with the relations or the forces of production separately. Behind their arguments there seems to lurk an implicit assumption that while forces of production occur in a multitude of concrete forms, modes of appropriation of surplus-labour (for some unexplained reason) only occur in a limited number of forms, thereby permitting the identification of a limited number of theoretically valid modes of production.

As far as the analysis of a concrete example like that of the Duna is concerned, Hindess and Hirst's objections appear to lead nowhere. As they insist, the purpose of theory is to make possible the analysis of concrete situations. They appear to be unaware that the Guro example, characterized by a highly collectivist organization of production and distribution, is not typical of lineage-based societies in many other parts of the world. Even if one accepts that a collectivized lineage under the domination of an elder with a monopoly on bride-wealth can be taken as an example of primitive communism, it is difficult to see what relevance this conception may have for an understanding of those New Guinea communities where production is largely arranged at the homestead level and where lineages provide an arena within which competing individualistic big-men arrange distributions with the primary aim of enhancing their own power rather than meeting the needs of their groups (cf. Sahlins' basic formulation of the big-man syndrome as political economy: "Poor Man, Rich Man, Big Man, Chief: Political Types in While it may be useful to elaborate a theory Melanesia and Polynesia"). of primitive modes of production in advance of the analysis of particular cases, it is still necessary to begin with some notion, however intuitive, of the mechanism or mechanisms by which surplus-labour is appropriated in the communities for which the theory is intended.

Here reference may be made to Sahlins' (1971, 1972) analysis of domestic labour intensity among the Kapauku villagers of Botukebo, based on Pospisil's ethnography. Unlike the profile of actual labour intensity in Mazulu village (are other African systems similar? would a profile for the Guro resemble the Mazulu profile?), the average line of actual labour intensity per worker in Botukebo village slopes upward to the right even more steeply than in the Mazulu instance, and lies above the Chayanov slope at all points. This indicates that the effects of wider networks of sociality upon Kapauku domestic production are goading each domestic unit into surplus production, and without any accompanying socialization of work loads. 6 Mechanisms of surplus appropriation and distribution could equalize consumption among the domestic units, but the ethnography indicates that this is not the case. Households which produce insufficient food for their own needs must either starve or go into debt. In the end there is little choice but to disband and be absorbed into other households (Pospisil 1963a:187). Unequal work loads in the Kapauku economy are not a matter of "from each according to his ability", since the unequal capacities of workers are already assumed in Sahlins' computations. Rather, as the ethnography of the Kapauku convincingly reveals, the unequal distribution of labour is but one aspect of a highly individualized economy in which emphasis is placed upon inequalities of wealth (Pospisil 1963b):

All Kapauku economic undertakings are executed primarily because, as the natives put it, ani beu kai peu, "I need", or "I want to do it for my own benefit". I have never heard an economic argument in which the needs of a social group have been put forward as justification for a position taken by a discussant. Consequently, because it is always the Ego who "needs things" and who, through his effort, acquires these, it is not surprising that all commodities are owned individually, thus leaving almost no room for common property (p.89).

[The] individual becomes prominent in his group through his own effort and skill in amassing great wealth and in redistributing it cleverly among less fortunate individuals, who thus become his debtors and dependable supporters ... (p.90). "Kapauku live in a wealth-and profit-oriented society"(p.93). Not surprisingly, Pospisil explicitly refers to the Kapauku economic system as "a simplified version of capitalism" (p.18).

Similar references to "primitive capitalism" and capitalistic economic practices are not difficult to find in the New Guinea ethnographic literature.⁷ In the case of the Kapauku, Pospisil lists the following "capitalistic features":

... the existence of true money, savings, and speculation, a market regulated by the law of supply and demand, an emphasis on wealth that surpasses in its magnitude that encountered in our own society, the dominant position of sales in the exchange of commodities, the use of paid labor and of lease contracts, ... combined with a strong indigenous version of individualism (1963b:29).

Similarly, Epstein (1968) writes of the Tolai of New Britain:

The stimulus to most activities beyond meeting their subsistence requirements was the desire to acquire and accumulate shell money (p.24).

The Tolai 'big man', like a true capitalist, invested his resources in order to increase his wealth. It was relatively easier for a rich Tolai to become richer than for a poor man to start on the ladder of success (p.28).

They had in fact clear-cut concepts of ownership of resources, employment, and reward for labour, as well as of profit and accumulation of wealth. The 'big man' paid the bridewealth for young men of his kin-group, who then had to work for him to pay off their debts. In this way he used tambu [shell money] as capital for productive investment (p.29).

Other areas of New Guinea lack such developed forms of money, but anthropologists have nonetheless commented on the materialistic acquisitiveness and drive for the accumulation of valuables characteristic of the people. Read (1965:60), for example, writes that the Gahuku of the Goroka region are "... materialists concerned to the point of exhaustion with the acquisition of wealth and its distribution in a never-ending series of competitive exchanges", and Finney (1973) writes of a Gorokan "spirit of capitalism". Less anthropologically sophisticated observers also come to similar conclusions. Participation in the moka ceremonial exchange, observes Simpson (1962:287), "has tended to make the Mt Hagen native more ambitious, more materialistic, more 'grasping', less joyous and bohemian, more bourgeois and business-like ...".

Generalizing from these reports, the following features may be distinguished as distinctive of putative New Guinea capitalism:

- an ideological commitment to the acquisition of wealth, in most cases by the individual rather than any collectivity, expressed in cultural emphasis upon (individual) enterprise, thrift and accumulation;
 - in 'classical' examples like the Kapauku and Tolai, a 'monetization' of the economy. Primitive forms of money (e.g. shells) are used as a medium of exchange and a store of value in all spheres (including brideprice in some cases), and are found in association with other institutions typical of monetary economies such as investment, credit, profit, interest, savings 'banks' with 'bankers' and so forth;
 - the acquisition of wealth seems to depend more upon managerial/political ability in arranging social ceremonies of exchange and distribution than upon either ability as a direct producer or control over the means of production through ownership of land or other resources;

inequalities in the distribution of wealth are immediately apparent in these societies, and are closely associated with the attainment of power and influence, and the management of affairs both within and between lineages. The wealthy are the political leaders of society and they deploy their wealth to maintain their position within their social unit, or to maintain their unit's position in relation to other units through the pursuit of war or the underwriting of hegemonic influence in a state of peace.

But to put these features within the framework of the theory of modes of production, it must be noted that none of the anthropological studies cited here understand capitalism in the sense understood by Marx.

"Capitalism" in these alleged cases is little more than a descriptive term and so far no anthropological theory of a primitive capitalist mode of production has been produced.

To clarify the problem, the distinctive features of capitalism as a mode of production (that is, as the object of Marx's theory, not as the concrete reality of 19th century England) may be briefly recalled.

Capitalism consists in a set of social relations existing between the principal actors in the dominant form of economic production:

& t

Firstly, there is a separation of the producers from the means of production, which are owned by a minority class. Consequently the producers cannot 'work for themselves', but are compelled by their economic situation to work for this class. Secondly, the means of production must ... be capable of producing output in excess of the necessary consumption requirements of the producers. Without this, the owners could not exploit the producers and receive an income arising from their ownership. Thirdly, the two classes, owners and producers, must interact through periodic exchange, thus giving rise to the system of 'wage labour'. Finally, the subjective aim of the owners must be the unlimited acquisition and accumulation of wealth. The system is not a capitalist one if they employ wage labour solely to service their own direct consumption requirements (Howard and King 1976:12).

Considered in this perspective the apparent capitalism of certain New Guinea societies fails to be an instance of a capitalist mode of production by at least as much as it fails as an instance of primitive communism. All men in these societies are able to work for themselves on land owned by their lineage as a collectivity. Although the means of production are certainly capable of producing a surplus, ownership of the means of production does not appear as a dominant factor in the appropriation of surplus. While wage labour is apparently a possibility among the Kapauku and Tolai, it occurs but rarely and not as a dominant form of relationship among the parties to the production process. Moreover, when labour and goods are exchanged as commodities it is still the case that the labourer has the option of choosing to work his own garden instead of another's. Only in the subjective aims of the big-men do New Guinea economies really resemble the economic mode of production of capitalism, for under the big-man's direction the goal of production is not the satisfaction of consumption requirements but the unlimited expansion of wealth and power. Even here a distinction can be noted, for the capitalist aims to maximize profits while the big-man aims to maximize his position as much or more in the political realm as in the economic.

But further reflection suggests another consideration. The existence of differences in wealth among individuals has suggested the

191.

possibility of a primitive class system, and the communal ownership of land by the lineage has required the rejection of this hypothesis. Yet there exist in these societies two distinctive groups of economic actors with fundamentally different relationships to the means of production: men and women. Women, although they are equally the owners of the land together with the men of their lineage, are separated from their land by the practice of exogamous, patri-virilocal marriage. Women, or more accurately wives, are compelled by their situation in marriage to work for their husbands rather than for themselves (or their brothers). Since women produce more than their necessary consumption requirements, there is a possibility of exploitation by their husbands. Men and women in their roles as husbands and wives then interact with each other as controllers of land/owners of gardens on the one hand and dispossessed direct producers on the other. Wives as a group receive for their direct consumption whatever part of their product their husbands allocate to them, while men as a group appropriate their surplus in the form of pigs to be dispersed in social and commodity exchanges. Women as a group receive for their consumption whatever portion of the social redistribution of pigs as pork the men conducting the distributions decide upon. Finally, while the aim of the woman as producer may well be little more than the satisfaction of consumption needs, the aim of men as controllers of production is the potentially unlimited expansion of wealth and power. Every man is a potential big-man just as every capitalist is a potential tycoon.

192.

In this perspective the resemblance between capitalism and typical New Guinea Highlands economies (even in cases such as the Duna, where differences in wealth are not marked and monetization of exchange is not dominant) is undeniable. The main differences are that

- men are not a minority class,
- 2) women are compelled to work for men not by an economic necessity but by a necessity of "kinship" and
- 3) the system of interaction between men and women is mediated not by wages but by the "currency" of domestic relations: food, sexuality, children, affection and friendship, or hostility and blows.

Otherwise there is a striking parallelism throughout. Capitalism and systems of production in Highlands New Guinea have analogous structures: one is a structure of exploitative class relationships based on economic ownership of the means of production, the other appears to be a structure of exploitative sexual relationships based on the ownership ... of what? The meaning of a Duna expression used in refering to the men of the parish, *ima aua*("owners of women") suddenly becomes clear.

Intuitively, this seems a formulation of a mode of production appropriate to the Duna example. While allowing for the communal ownership of the land (fundamental feature of the various notions of communistic production), it at the same time allows for non-antagonistic differences in wealth within the lineage. These differences can be the result of differences among men in the efficiency with which they exploit domestic labour. By postulating the exploitation of women by men, it becomes possible to account for some of the apparently capitalistic features in Highlands economies without having to assume the existence of social classes (in the sense that they are understood as eliciting a necessary juridico-political superstructure in the form of a state apparatus). I will attempt to "prove" this intuitive conception of mode of production by applying it as a conceptual tool for the interpretation of Duna ethnography.

strated well it is a set

W nother was "talk a real of

the second s

/13/ Production, Distribution and Consumption Among the Duna: Units and Relationships

Terray (1969:153) has made the important observation that the presence of relations of kinship within a mode of production appears to be a correlate of a homology between production and consumption units. Thus, in capitalist production the production units are corporations, factories, etc., while the consumption units are households coordinated by relations of domestic kinship. There is no homology between production and consumption units, and correspondingly no kinship relations within the mode of production.¹ At the other extreme, in <u>Sahlins' DMP there is a complete</u> homology, and the relations of production and consumption units, so f domestic kinship. In primitive societies there are usually several different levels of production and consumption units, and Terray suggests that the dominant unit in a formation will be that one which displays the greatest homology and overlap between relations of production and consumption.

In Duna country there is a hierarchy of units concerned with both production and consumption, beginning with the individual and continuing through the domestic homestead groups composed of those individuals, through the local lineage-groups within which homesteads are articulated, to the parish-group, articulating several lineages. Complicating this picture further, there are garden groups organized for production out of a selection of neighbourhood residents from several lineages, and neighbourhood consumption groups organized on an even more ad hoc basis from neighbours and passers-by at the time of the afternoon meal, divided by sex into men's and women's cooking groups. Finally, it is often the case that people who prepare food together do not eat together, but instead divide equal portions among themselves for individual consumption later on in the day, or for further distribution at each person's home-"Sharing" (weiya)² is a cardinal principle in Duna social stead. A mother who "thinks good" will divide even the smallest relations. morsel of pork equally among her children to keep them from becoming Men constantly admonish boys not to eat pork by themselves, but "angry".

8.10

1

In Duna country the forces of production have developed to the point where it is possible for an individual to survive on his own as a self-subsistent production and consumption unit. Men can carry out all of the subsistence tasks necessary for survival, and there are in fact a few men who live on their own without women or other men to help them in preparing and cultivating gardens and caring for pigs. But although self-subsistence is a possibility for an individual, no man would ever think of rearing pigs solely for his own consumption. Pigs are reared primarily with the aim in mind of "helping" (*piatsaiya*) one's lineage mates and other kin. The consumption of pork is largely regulated by social redistribution. As Paliawe of Foraile' explained it:

On my own I'm not enough. Everyone thinks this: suppose some trouble befalls me, someone demands compensation (damba) from me or I'm accused of sorcery. Then what will I do without my brothers to help me? That is why we always think of helping (*piatsaiya*) our kin, and why we give our pigs to our brothers even when we are a little angry with them.

Thus even the solitary recluse who lives on his own produces his pigs in order to participate in the social life of his residential lineage and of those other lineages where he wishes to keep up his involvement in the affairs of other places. This participation takes the form of "helping" others to accumulate pigs for the payment of compensation, or for the purchase of brides, or for the celebration of mortuary feasts on the occasion of the secondary burial of a kinsman's bones. Each time a man helps a kinsman or affine, he creates a debt which it is understood will be repaid by reciprocal help in the course of time. In this way the helping of kin not only gives a man access to the social activities of the several kinship/local groups to which he recognizes a connection, but serves as well as an insurance policy or "bank" by which a man can store up credit through past pig production against the possibility of future unforseen necessity.
Women, unlike men, are unable to live anything like a normal existence on their own. They cannot perform all the tasks necessary for subsistence. Women are unable to use a bamboo thong to kindle a fire; they cannot kill pigs or build houses (or so at least men say, and I never heard of an instance suggesting otherwise). And although women can use axes to chop firewood, it seems agreed that no woman is strong enough to clear a garden on her own. Curiously, although no woman owns bow and arrows, several women have been known to use them to good effect against raiding parties and even their own husbands. Still, a stick of firewood is the usual weapon of most women. Despite the impossibility of a normal existence, there were three women at Horailenda who chose to live on their own. They stole embers for their fires and sweet potatoes to eat, and lived in rockshelters and abandoned houses. They all appeared to live wretched existences and were regarded by everyone as mad. Such is the price of independence from men.

196.

Individuals are combined together into homestead units, the predominant form of which is the nuclear family of husband, wife and children. In table 13:1 the homsetead groups at Horailenda are tabulated by composition.

Fifty-six (68%) of the homesteads of Horaile' are organized around single married couples. Only three homesteads are based on polygynous marriages, although polygyny increases in frequency as one moves up-valley and beyond into Huli country. The remaining 28% of homesteads contain no relationship of marriage.

There are ten homesteads occupied by men only, two of which are occupied by a principal owner together with a "friend", while the other eight homesteads are occupied by solitary men. Most of these men, however, have "friends" living nearby. Most men usually spend the night in the company of friends and "brothers" at one homestead or another. The relationship of "friends" (*nendeke*) is an important one among Duna men, the more so because brothers are normally expected to be on slightly uncomfortable if not hostile terms with one another. True brothers rarely live together, but instead establish homesteads in different parts of the parish, or even in different parishes.

/13/

Composition	No. of home- steads	Average no. of men (15+)	Average no. of women (15+)	Average no. of children
No marriages within homestead:				
men only	10	1.4	0	0
<pre>man and his mother and/or sister(s)</pre>	10	1.1	2.0	.6
widower and children	3	1.3	.7	2.3
One marriage within homestead:				-
married couple only	5	1.0	1.0	0
married couple + children	34	1.1	1.1	1.7
married couple + wife's kin	6	1.7	2.0	1.5
married couple + HM and/or HZ	4	1.0	2.5	2.75
married couple + husband's friend	4	2.0	1.0	.75
married couple + HM and/or HZ +				1.5
husband's friend	2	2.0	3.0	1.5
married couple + HZ + WM		1.0	- 3.0 · /	√17.0 -
Two marriages within homestead:	3	1.0	3.0	1.7
Total homesteads and occupants	82'	101	108	103

Table 13:1 Homesteads at Horailenda

The discrepancy between these totals and those indicated for Horailenda in Appendix A is due to 19 men and 13 children who were absent from the parish as wage-labourers and students.

1

The basis of hostility between brothers is recognized to be their mutual competition and inability to cooperate in productive activities and in the distribution of wealth. Much more than fathers, who are often old enough to retire from active concern with the affairs of production and exchange by the time their sons reach maturity, elder brothers are expected to be domineering and to subordinate the interests of their juniors to their own interests as the central authority within the homestead (assuming the father's death or retirement). People say that younger brothers should be obedient and listen to the elder brother's words, but they recognize that this is irksome and consider it natural for a younger brother to rebel. The breaking point often comes with the death of the father, for elder brothers seldom allocate pigs to their junior siblings when they distribute the inheritance or the bride-price received for their sisters. Hostility and competition between brothers is also a basic theme in parish origin stories and accounts for the founding of separate lineages. What begins as a hostility within the family comes by extension to be seen as a hostility between the lineages of a parish. Although it is "bad" that men related by blood should fight one another, it is nevertheless . recognized that kenikeni weiyana ("brother-brother fighting") is at the basis of almost half of all wars.

So far as the relationship of *nendeke* is concerned, although these men are often linked by more or less remote connections of consanguineal kinship, the use of the *nendeke* idiom avoids the implications of dominance and subordination which would arise if the distant relationship were assimilated to a close one on the basis of classificatory terminology. Relations of friendship last over many years and are mostly based on non-competitive dominance and subordination similar to that in White Australian mateship or the American "partner" or "side-kick" relation. In the Duna view, one member of the partnership is a "man with talk" while the other is usually a "man without talk" (who.may excell at gardening or fighting). Usually only one of the two, the dominant one, will be married.³

The relationship between a man and his mother is also a close one of cooperation, affection and mutual interest. Eight Horaile' homesteads are organized around this relationship, mostly the homesteads of young men who have yet to marry, but in some cases those of older men who show little inclination for marriage. Older women without husbands are almost always diligent in tending their sons' pigs, and unlike other women who cannot find their tongues in public, these women often speak in support of their sons' interests in debates. A widow with one or more promising sons who continues to live with them in her husband's parish has reached the height of authority and influence in public affairs possible for a Duna woman. But although such women are generally respected and listened to, and although men say that no man could ever find cause to be angry with his mother, it is nevertheless the case that young men. occasionally dream that their mothers come as witches to attack them in their sleep. I recorded three cases at Horailenda where young men publicly accused their mothers of witchcraft, and six other cases involving classificatory "mothers". In several cases the accusations resulted in the women's deaths.

Despite (or perhaps because of) this latent hostility between sons and mothers, men say that it is the mother who, ideally, should arrange for her son's first marriage. The explicit rationale behind this ideal is an economic one. Since it is the mother who has raised most of the pigs which will go in bride-price, it is she who in effect "marries" the girl. Moreover, since no man wishes to part with his pigs, men should avoid marriage until either their mother is too old to tend the pigs any longer, or the homestead herd has increased to the point where more than one woman is necessary. Since the wife must co-operate with her mother-in-law in the work of gardening and pig rearing, it is important that she be someone to the older woman's liking. So it is that a woman may arrange a marriage without even necessarily consulting her son. (However, Duna are not unfamiliar with the sometimes contrary pulls of romantic attachment.) It is a curiosity of the kinship terminology, understandable in this context, that a woman addresses her daughter-in-law (who will usually be thirty years her junior) as "grand-daughter".

There are a few homesteads occupied by men with only their In some cases these are old people, a widower whose wife has sisters. died and whose children have moved away, together with his siter who has returned to her natal parish (sometimes with one or two daughters) after the death of her husband. In other cases the man may be an anoa luali, a permanent bachelor, and his sister an ima luali or permanent spinster. Some men remain bachelors because they are unable to obtain a wife, due more to personal unattractiveness or feeble-mindedness than to any inability to raise a bride-price,⁵ but others do so out of choice, because "they don't like women". Formerly, these men were the custodians of each parish's palena (bachelors' bog-iris) cult, or they acted as religious specialists who knew the spells and ritual procedures appropriate to different kinds of auwi. Ima luali are said by men to remain spinsters by choice, because "they don't like men" or "want to live with their brothers". Some women refuse to have anything to do with sexual intercourse, but there are other instances in which it seems that women are frustrated in their desires for marriage by their brothers and so vow to remain single out of spite. In any case, men usually speak well of ima luali, saying that they mound sweet potato diligently and have more to feed the pigs since they do not have any children.

Relationships between men and their sisters are often inharmonious. In principle (that is to say, according to the principles of social relations as they are promulgated by men), brothers and sisters have common interests as equal members of their lineage: "they all share one blood", say Duna men. And in terms of Duna principles of cognatic descent, women as well as men can reproduce the lineage and provide a form of relationship with men of other lineages. As Yopa of Horaile' explained:

When they are young, our sisters look after our pigs and gardens. Later, other men marry them. We will get lots of pigs. Our sisters have children. If they are girls, we'll get some of the pigs for them too. If it's a boy child, then his mother is on our side here, his father is on the other side, and he stands in the middle!"

But in practice, men find that their sisters (like their wives and indeed women in general—with the usually unmentioned exception of mothers) tend to subvert what men see as the interests of the lineage:

We tell them, all our women, the women of our *damene* ... we say: 'You can mound the sweet potato, you can mind the pigs, you can sit down and behave yourselves. Don't 'big-head' about. Look after the children.' Men talk and women can listen. But women don't have any sense (*kono*). Women on their own just sit down and don't do anything. They eat and laugh and make *nu* (net-bags).

The problem, from the male point of view, is that women don't seem very interested in the production goals of the homestead and lineage. They are disobedient and don't listen. Because they don't listen they are without sense or knowledge. What is more, they cannot pass on men's *kono* and *mana* to their sons; they are ineffective in replicating the values and knowledge of the lineage in their children. A common expression in men's discussions used by the *imaga'ro* (the matrifiliated members) of the lineage is "I haven't heard of this; I was raised by my mother." That much of women's lack of knowledge of lineage affairs is due to their absence from the ground of their lineage as a consequence of virilocal marriage (not to mention the men's tendency to secrecy) is a point that Duna men overlook.

Marriage is also a cause of disharmony between men and their sisters in other ways. When women wish to marry, their brothers often object and refuse to accept the bride-price; and when women are angry with their husbands and wish to return home, their brothers often send them back again in order to preserve friendly relations with brothers-in-law. Although a man can look forward to receiving many pigs from his sister's marriage, a bride-price is of little benefit if there are no women at home to mound the necessary sweet potato and tend the pigs. For this reason men will often not allow their sisters to marry men of the women's choice, and demand instead that a prospective husband should have a sister whom they can marry in turn, to maintain their homestead's labour supply. On the other hand, while it is sometimes in the interest of a man with a useless brother-in-law to keep his married sister living and working at his own homestead as much as possible, the relationship between brothersin-law in ideally one of mutual trust and reciprocal support. Even more than one's own brother, a man should be able to count upon his brotherin-law to lend him pigs in time of need. Unlike brothers, brothers-inlaw can help themselves to crops in each other's gardens without asking.

(There is a mutual name-taboo between brothers-in-law, but no other avoidances. This practice, common throughout Melanesia, seems related to the avoidance of any mention of sexuality, particularly the sexuality of the common wife/sister, between the two men. The consequence of saying an in-law's name is sickness for the child of the union).

202.

It is evident that women, at least until they become mothers of older sons, do not accept whole-heartedly their brothers' and husbands' concern with production. From the age of ten or so young girls contribute much labour to their family's garden, but they are also often disobedient, neglectful of their tasks, and subjected to whippings and sometimes____ beatings in consequence. Some girls apparently see marriage as a way out of domestic drudgery, but husbands expect them to work as much as do brothers. The new wife may then "run away" again, back to her brother or to another man, and a few women go through several marriages and illegitimate relationships before they tire of being beaten and/or fall pregnant and decide to settle down and make the best of married existence. The process of breaking a woman's resistance to productive labour can be a frustrating one for the men involved as well. One man I knew had chopped off one of his finger-joints out of exasperation with his sister.⁶ In sum, the relationship between men and women, both as sisters and as wives, has much of the same quality as the relation between elder brother and younger brother. Men struggle to dominate the process of production within their homesteads by subordinating the interests of women/younger brothers. They do so for what they see as the common interests of the group, yet women (like younger brothers) persist in seeing their interests elsewhere. They "big-head about" and "run away".

The relationship of marriage among the Duna is a peculiar and in some ways mysterious one. I have noted that men say they enter into marriage because of the need for additional labour to maintain production within the homestead. In the same way, men deny that sexuality is a motive for marriage. A man would be like a pig or a dog, they say, if he married for sexual gratification. "Think of your pigs first, then you can marry", the older men are continually admonishing the juniors. Nevertheless, young men do sometimes give way to sexual impulses, and by "steal-copulating" with a woman they may force their lineage "brothers" to finance a bride-price when they themselves have few pigs. Or they may get their prospective in-laws to accept a down-payment on the brideprice with deferred payment of the remainder of the pigs until the married couple's herd is established. Men who are discovered in an illegitimate relationship sometimes refer to the believed-in autonomous nature of male sexuality to explain their actions and, hopefully, elicit sympathy from their "brothers". As one man said: "My penis stood up and wanted to copulate. What should I do? Cut it off?"

Few men actually have their marriages arranged by their mothers. Most men either have a nendeke act as match-maker with the woman's kin or themselves engage the woman's attentions by making small presents to her, sitting nearby and singing at courting parties (yekianda), or dancing alongside her; in the mali dance (a circular dance performed formerly to mark the payment of damba, and nowadays as part of Christmas festivities-see photograph 9). Not a few men precipitate their marriage by steal-copulation, often in the morning hours while returning from a courting party. Either with or without her own kin's consent, the woman gathers her net-bags and a few other belongings and shifts her residence to the women's house of her intended husband. The women of this house may perform a simple ritual, ima nu kuako gao ("woman's net-bag placed-inside spell"), to assure that the woman will be happy in her new home and that her brother will not make difficulties over the brideprice. The husband-to-be should bathe and put on new attire, and must not sleep until the bride-price has been transfered. Men recognize explicitly that this custom (now no longer observed) hastens the financial arrangements necessary for the marriage: "this man can't stay awake much longer, his brothers must help him with the pigs for the bride-price Should he fall asleep, it is believed that the woman's bird-soul now!" in the celestial Undutsale tree will hop over his own bird-soul and be gone-the woman will not stay with him in marriage even if the bride-If the bride-price is not readied in three or four days, price is payed. or if the woman's kin have no intention of accepting it, they begin agitating for her return. Otherwise, the pigs are taken to the brotherin-law's house or to some other spot mutually convenient to both parties (see photograph 7a-d) .



A bride-price should always be the same: four large breeding sows (dange) and fifteen smaller pigs (kulini and pakala). The number of pigs may vary, however, depending on their size. Men say that it is the groom's ability to pay that is in question, never the worth of the bride. There is no haggling over the payment in terms of the bride's qualities (ability to work, bear children and so forth), although in the case of re-marriages of women with several children it is usual to accept a much reduced payment. One of the sows in the payment is designated "dange warepu" and eaten by those of the bride's kin (both patri- and matri-kin) who are distantly related and attend the distribution of the bride-price but usually do not receive any of the pigs. In those cases where some genealogical connection is known to exist between the couple but the marriage proceeds. (because "they are only a little-bit siblings"), the groom must forfeit an additional large pig called hewa itsia, "pig of the sun". The sun is the apical ancestor of all people, "our grandfather" as people say, and he is believed to afflict the off-spring of incestuous unions in any degree with a wasting disease unless appeased with a pig. People with loose skin and loss of muscle and fat, whether or not they have an incestuous background, are known as "hewa ingini" and "hewa wane", "sons and daughters of the sun". The hewa itsia is slain and eaten by all who share a known consanguineal relationship to both the bride and groom, that is, all who-like the couple themselves-should regard themselves as "brothers" and "sisters".

The other pigs of the bride-price may be substituted for by other items of wealth: cakes of salt, "ropes" of shells, stone axe blades, and nowadays steel axes and \$2 notes. All of these items are referred to in the contexts of prestations as "pigs"—the pig is the basic unit of currency in the Duna economy. The bride-price is distributed by the bride's brother, father or other senior male of her lineage. The groom has no part in the distribution, although he should be present to take the pigs back in case negotiations fail. Likewise, the bride has no part in the proceedings, though she should be ready to return with her kinsmen should the distribution break down.

The principle of distribution is that a pig should be returned to each man who originally contributed a pig to the bride-price for the bride's mother. Those who contributed dange should receive dange, and those who originally gave kulini should receive equivalent kulini. Those men (or their heirs or representatives) who originally contributed to the bride-price for the bride's mother as nendeke rather than lineage "brothers" of the bride's father should receive their pigs first, and after them the men of the father's lineage who contributed. After all these obligations have been met the remaining pigs may be kept by the distributor or distributed among his immediate kin as he sees fit. One large sow should be given to the bride's mother's brother, in recognition of his lineage's share in the reproduction of the bride. However, before the distribution reaches this stage, the proceedings have often broken down and the would-be groom sent back with his pigs. The difficulty is that the original contributors to the bride's mother's bride-price (and their respective shares) are somtimes forgotten. To complicate matters, many of the original men have died and there are subsidiary disputes between rival heirs to the inheritance. What is worse, debt-hunters with no right to the bride-price at all often hear that the distribution is taking place and attempt to press their claims, either against the bride's kin, or against the potential recipients, or against the groom and his kin. Anyone is fair game when pigs are assembled, tethered at stakes and ready for distribution. The resulting confusion of claims and counterclaims is often too much for the distributor to handle. Tempers flare and fights sometimes break out, so that even with the best intentions the bride's kin are sometimes driven to call off the marriage.

205.

If the distribution is successfully completed, the groom may at last sleep, and the bride may settle down to production activities under the direction of her husband's mother or sister. Occasionally the bride and her husband's mother do not get along well together, and in this eventuality the husband should send the woman back to her kin and request the return of his bride-price (no easy matter, since the original pigs should be returned although they have now been distributed to many parties outside the bride's lineage). Except in those cases of marriages precipitated by steal-copulations, the newly married couple should not consummate their union until the husband's pig magic has had time to work and the depleted homestead herd is back to full strength - a period of at least

22

.....

nine months. During this period a man can see how well his wife works in the gardens, how well she "hears" his instructions. Until he copulates with her he is always entitled (in Duna jural principle) to send her back and demand the return of his bride-price. In fact, this early period of the marriage is frequently a difficult one for both parties, and more often than not it is the woman who leaves first rather than the man who initiates the annulment.⁸

What does the payment of nineteen much-valued pigs entitle a man to in the way of rights in relation to his wife? This is the mysterious aspect of Duna marriage arrangements, for I have yet to meet a Duna man who can simply explain the matter. It is easier to specify the rights that are not acquired by the payment of bride-price. Although a man acquires an interest in his wife's labour, he does not acquire a right in it. He does not acquire a housekeeper or cook, since the adult man and woman live, cook and eat separately at all times. He cannot compel his wife to work, for she can always return to her brother and work for him insteadthe marriage still stands so long as the couple are known to have copulated. Many women do in fact make periodic working-visits home, and those few women who marry within their parish usually continue working half-time in their brothers' gardens. Payment of bride-price does not acquire rights in children (although it determines an interest in their up-bringing), since in Duna ideology people belong to all the lineages to which they recognize consanguineal connections, regardless of whether their parent's union was legitimated by bride-price or not.9 As people say, "the child stands in the middle, he will come and go and live with both his 'mothers and his fathers'". This idea is also expressed in the idiom "kaki tsuru", which can be literally translated as "half-side happy". Everyone is "kaki tsuru", on equally good terms with both sides of their kindred. The idiom is used whenever people wish to remind one another that divided interests must always be recognized.

There is also a curious ambivalence among the Duna about children, and this may have some bearing on the absence of concern with jural rights over them. Although men say that they wish to have sons who will grow up and follow their ways, and daughters who will tend pigs and bring in more

pigs, they also say that children compete with pigs for the available time and energies of women. Moreover, children, because their bodies are composed half of their mother's blood and half of their father's semen, and because they drink their mother's milk to grow, must in the nature of things sap their parents' strength and "dry" them up. Producing a baby requires repeated acts of intercourse which are "hard work" for a man, and nursing a baby likewise "dries up the mother's grease". Finally, Duna say that they are not overly anxious to have children because their children are their "replacements" (*pelananda*) who will hasten, in some mysterious way, their parents' deaths. Particularly when a child closely resembles its same-sex parent, people say that the parent's end must be near.

One thing that is acquired through marriage is a right to receive pigs in respect of the future marriages of all daughters born of the union. Here, the bride-price system operates as a form of investment bank with an added factor of chance. If the woman has no daughters who live to marry, then there is no return to the investment. On the other hand, if the woman has several daughters, each daughter's marriage brings in as many pigs as were originally invested in the mother. Friends usually invest a single pig in each other's marriages, and lineage brothers contribute more, while a man should ideally provide the larger portion of the bride-price out of his own stock. This investment function obviously has some appeal to men, since distant friends and kin who only hear of the marriage after the distribution will "itsia gimbuya" with the husband, that is, give him a pig in exchange for the right to claim the return bride-price in respect of one of his pigs. That bride-price is the crucial factor in determining rights in subsequent distributions is revealed in the case of illegitimate daughters. Where a man has not paid bride-price for his wife, even if he continues to live with her and help in the rearing of the children, he cannot claim the right to distribute his daughter's bride-price. This right remains with the mother's kin. But although men appreciate the chance to invest in a friend's or kinsman bride-price, this factor alone does not seem sufficient to account for the institution.

There remains a final possibility, a possibility which Duna men invariably deny: what a man "owns" in exchange for his pigs is the right to exclusive copulation with his wife. This is perhaps implicitly revealed in an idiom used of those who eat the warepu or any other pig of the bride-price despite close consanguineal relations to the bride: to do so is to "eat her cunt". No one can explain this idiom (see Glasse 1968:57 for a similar explanatory blockage among the Huli), but it evidently equates the bride-price with the woman's genitals, implying that that is what the payment is really for. Jural principles concerning the return of bride-price confirm this. A man can only claim back his pigs if he has not consummated the union with his wife. Within Duna jural principles, divorce is not possible. After consummation of the marriage the woman may choose to permanently reside with her brother, refuse further intercourse, or prove to be infertile-it does not matter, the couple are still married in principle. Only if she commits adultery with another man can the husband be quit of her, by demanding that this man marry her and pay bride-price to him, the first husband.

While it seems then that the only thing "purchased" with brideprice is the right of sexual access to a woman, it is also important that men wish to conceal and deny this fact, and that they criticise their Oksapmin neighbours for doing the same thing. But the criticism that Oksapmin men don't get enough labour out of "their" women (and are therefore in Duna eyes "only paying for cunt"), reveals a second aspect of the marriage relationship. While the de jure rights of Duna men in women are limited, their de facto interests are much larger. Although a woman in principle need not labour in her husband's garden, in fact almost all women do so labour, and most of them labour exclusively for their husbands and for no one else. Here one comes upon a paradox which appears the mirror-image of the paradox of wage-labour under capitalism. Capitalist production (and the necessary exploitation of the direct producers within it) depends, as Marx insisted, on the workers being "free" in a double sense: free from all political and ideological bonds that compel them to labour in relationships outside of the market-place where they "freely" sell their labour, and "free" of any means of production of their own, by which they might labour on their own behalf

and avoid entering the market. The condition of a married woman in Duna country is the reverse. Legally, she is neither free of the bonds of consanguineal kinship and affinity which bind her to her brother and her husband, nor is she "free" of any means of production of her own, since her lineage's lands are "hers", (as are her brother's gardens). She need not labour for her husband since she can labour on behalf of her own lineage instead, or indeed can labour elsewhere on a "contract" basis. But, and this is the paradox, factually her conditions are the opposite of the jural conditions of her existence. In fact, a married woman is only free to participate (like the worker under capitalism) in the conditions of her own exploitation. Factually she has little choice but to labour in her husband's gardens, since she lives there with him and not with her brothers elsewhere. And the condition of this factual necessity is the single and concealed condition of the legal relationship by which she is bonded to her brother and husband, the fact that they do not "own" her at all save in one respect-that her brothers have "sold" her sexuality to her husband.10

To return to the question of homology and dominance among production and consumption units, it is clear that the problem in the Duna example admits no simple solution. Production, distribution and consumption are all carried out at several levels and on several structural bases with a complex and cross-cutting arrangement of overlapping interlinkages. The True, in the de jure principles dominant production unit is the homestead. of the Duna, the homestead is not a unity. Not only may wives work for their brothers in other homesteads, and sisters for their husbands elsewhere, but each woman is in theory a free labourer, who may arrange with any man on a contractual basis to mound his garden in exchange for a portion of the harvest or for payment in shells, a pig, or some other valuable. But in actual practice few women enter into contractual arrangements with men other than their kin and affines. Most women perform garden labour for their husbands, servicing their brother's garden as well if he happens to live nearby. This labour is in principle also based on an implicit contractual agreement. Husbands and wives, like

(- *

- alte

1000

co-resident brothers and sisters, are joint owners of the homestead estate. Although a man or a woman may claim to be the "owner" of a particular pig acquired through extra-domestic networks of kinship and friendship, any pig born to a sow of the homestead, or tended for long within the homestead, becomes the joint property of the marriage (or of the co-resident siblings). The usual arrangement is that a man supplies piglets or breeding sows to be tended, and the garden site to be mounded. Women supply the labour of mounding the garden and harvesting for and feeding of the pigs. The pigs which are produced and reproduced are joint property: "half of the pig belongs to the man and half to the woman': he can't send the pig elsewhere without asking her first".¹¹

Under the direction of authoritative men of the lineage, the production capacities of several homesteads are more or less coordinated. Particularly in times of war, when there are large indemnity payments to be made for the deaths of allies (as well as pigs to be sacrificed on behalf of the wounded and rewards for men who succeed in killing an enemy), the influential men of the lineage who are wei tse ("war origin", that is, the men at the root of the conflict) will urge their lineage "brothers" to increase production. Wei mbou ("war gardens") are planted, both in anticipation of planned wars, and immediately following unplanned conflicts. (Men who plan wars in advance must arrange a supply of sweet potatoes sufficient to feed their many allies for the duration of the conflict. These men often come from parishes several days' distance away and will leave the fight if they are not properly fed). At other times pressure is relaxed and individual homesteads (or combinations of homesteads such as those at Yuku, loosely co-ordinating their efforts around a joint garden site) may go their own ways in planning pig production. So long as the lineage has no outstanding war debts, a man may think about putting his homestead's pig production into a bride-price, for a wife for himself or for one of his "brothers" or friends. Or he may invest his pigs elsewhere by piatsaiya (helping) his kinsmen with whom he is not residing at the moment. In principle, even in times of war each individual homestead head decides for himself how much he will contribute of his production to the financial activities of his residential lineage and the other lineages with which he maintains relations. (There are

also the kinship interests of his wife to think about. As the pigs are half hers, she must give permission before they can be contributed to her husband's local lineage to make up *damba* (compensation payment) or sent elsewhere to other of her husband's kin. She may wish to send a pig to help her kin instead, in which case the husband's half-interest goes with his wife's as *ima loma* ("help to women").

Although a man should always contribute to damba when his local lineage has been at war (since wars are conducted to secure the rights of individuals and collectivities against unlawful trespass), it sometimes happens that the financial strain created by this support become too much a burden for some homesteads. When this happens a man is free to move his homestead elsewhere and live with another group of kin. He may even to to live with his wife's kin, although men universally condemn uxorilocal residence. It is contrary to the principle of support for consanguineal kin. Moreover: "it's not your ground there at your wife's place and it's not right. You don't know the men there and they try to 'pull' your pigs (that is, extract contributions of ima loma)". In any case, whenever a man feels that his residential group asks too much of him he may move elsewhere. Since it is accepted that every man of the residential group is kaki tsuru (has divided interests with others of his kin), bad feelings are usually avoided. A man will say, for instance, "I've given all my pigs helping here and now I want to think about rearing more. I'm not angry with you but my 'mothers' (mother's brothers) are calling for me." Nevertheless, the men who remain behind are conscious that they have lost a production unit as well as an able-bodied fighting man from their group. Because individual men are always free to leave, the men of the local lineage group must moderate their claims upon their members, and this is the basis of a particular structural weakness in the Dune cognatic lineage. Not only can the lineage not hold its members, but it cannot demand too much production of them while they are resident. (Obviously, the powers of the lineage as a production co-ordinating unit are greatly enhanced under more patrilineal regimes such as those of the Enga and Hageners. Not only does patriliny increase the lineage's hold on its male members who cannot so readily move elsewhere, but it also tightens the grip on women's labour by assuring that viri-local residence will more certainly removewomen from their mothers, brothers, sisters and other natal kin).

Distribution and consumption of the product also occurs at several levels. Within the homestead there is no pooling of horticultural produce and the men and women of the group arrange their distribution and consumption independently. Men and women harvest separately for the separate needs of their separate households within the homestead. If women wish to eat bananas or marita pandanus or other special vegetables, they must first plant their own banana trees, pandanuses, etc., or arrange a commodity exchange with men. Perhaps the most important of these exchanges involves the manufacture of net-bags by women for exchange for male-produced pandanus nuts. Women noticably eat much less marita pandanus than do men, and men say it is their own fault for not having the foresight to plant the marita. On the other hand, women plant for their own consumption a larger variety of greens than men cultivate for themselves, and women also gather wild greens, mushrooms, and occasionally lizards and grasshoppers which are mostly ignored by men. Pigs produced within the homestead are occasionally consumed within the homestead, particularly when they die unexpectedly of some illness. Since the pig is the joint product of both the men's and women's households within the homestead, it must be divided between them. Men almost always butcher pigs, since they say that women don't know how to do it properly. Using an axe, the pig's head and spine are severed from the body and a second cut is made along the breast-bone, thus dividing the pig into two halves. One half, along with the entrails and most of the viscera, is given to the women to cook, divide among themselves and eat, while the other half together with the head and spine is kept by the men. Men and women prepare their earth-ovens separately and eat in physically separate parts of the homestead.

The majority of pigs, however, find their way into the network of social exchanges. Their distribution and consumption will be considered below. At this point it is sufficient to note that either the lineage or an *ad hoc* bilateral, ego-centered kindred (also called *damene* by Duna) operates as the distribution unit, while consumption is again carried out in separate men's and women's groups.

Finally, there are periodic crises of over-production in which the men of a lineage (or of several related "brother" lineages, or the men of a parish as a whole) find that they have too many pigs to be maintained by their available production of sweet potato. When this happens the lineage or larger structural group authorizes the wholesale sacrifice and auto-consumption of the larger part of the entire pig herd under the guise of an appeasement offered to the ancestral auwi of the group. The auwi are regarded as the ultimate controllers of the fertility of the soil as well as of the health of men and pigs, and by sacrificing the herd in a gigantic religious pig festival it is believed that the ancestral powers will restore the production of sweet potato to a level where there is enough for everybody and their pigs to eat again. That the crisis which precipitates these religious pig festivals is a crisis of over-production is a matter of my own interpretation.¹² Duna themselves no more conceive of the possibility of over-production than do captains of industry under capitalism. The point to be appreciated here is that, unlike the pig festivals of the Enga, Hageners, Maring, Kapauku and most other Highlanders, Duna pig festivals are not planned for in advance. Rather, they are forced upon men when it is perceived that there is too little sweet potato for the consumption needs of the population and its pigs. And whereas festivals elsewhere in the Highlands are mostly linked with explicitly political and economic aims, the festivals of the Duna are conceptualized as a part of their religion. I shall return to these matters in Part Four.

It appears then that no single unit dominates the Duna social formation as a simple homology of production and consumption relations. The homestead is the dominant unit of production, the lineage the dominant unit of distribution (so far as the surplus product represented by pigs is concerned) and the local neighbourhood or homestead sex-group of men or women is the dominant unit of consumption. To a much lesser extent, individuals are able to act as self-subsistent production/consumption units; lineages may act as production units; and parish-wide groups oversee the mass consumption of pork at long intervals in major *auwi* festivals which are also crises of over-production.

How can these complex relations and articulations be understood in terms of a marxian theory which postulates the ultimate determination of relations of distribution and consumption by the relations of production? For the present I am able to offer only suggestions. The dominance of sex groups in consumption appears based upon their fundamentally different roles in relation to the production process. This seems as much as consequence of their different relations to the factors of production as it is a consequence of the sexual division of labour. Under capitalism, for instance, husband and wife usually share common cooking and eating arrangements, although their tasks allocated by the sexual division of labour are different (one is the producer of labourpower, and the other is the reproducer of the producer). What remains constant is that both are equally deprived of means of production of their own, and hence in a sense both are working in the employment of the capitalist. It is capitalists and workers who segregate their consumption activities, not the sexes. In the Duna example, by contrast, wealthy men and poor men eat side by side, while the segregation of consumption activities is carried out on a sexual basis. There is still a sexual division of labour (although women are involved in direct production to a much greater extent than under capitalism, while their role in reproduction is reduced to child-bearing and child-minding, with housekeeping and cooking being done by and for themselves alone). But the difference lies in relations of ownership: men are the direct owners of the means of production (land, garden sites), while women have been separated from their means of production by virilocal marriage arrangements and their inability (cultural? biological?) to clear garden sites for themselves. It is this separation from direct ownership which appears to be the basis of the sexual segregation of consumption. Men, like capitalists, live apart from and consume differently from women who, like workers, have been separated from means of production of their own.

That the homestead is the dominant unit of production while the lineage is the dominant unit of distribution of surplus can perhaps best be conceptualized as an instance of "cross-dominance" (Terray 1969: 161-62). That is, the homestead as a unit cannot survive without

attachment to a wider lineage structure, since isolation means loss of military and financial support. Homestead members could not survive if there were no lineage "brothers" to come to their defence in the event of attack, nor could any homestead rely upon its own production capacity for the bride-price necessary to reproduce itself and the *damba* payments necessary for the preservation of peace. In turn, the lineage cannot exist without its composite homesteads. The chief functions of the lineage are warfare and finance (and to a lesser extent, the maintenance of relations with ancestral *auxi*). None of this can take place without the production of pigs and the reproduction of people, and the latter of these functions particularly seems appropriate to small domestic units. Thus, the lineage and the homestead are the necessary conditions for each other's existence.

This is not to say, however, that relations between lineages and domestic groups are equally co-dominant in all lineage-based social formations. The Guro example, and perhaps even the examples of the more patrilineal Enga and Hagen societies, shows that lineages can come to hold the upper hand over their composite units. On the other hand, among the Hewa and Baktaman, domestic groups appear stronger than the lineages which contain them. Lineages are small and territorially dispersed, and either have difficulties maintaining exogamy or do not maintain it at all. Domestic groups among the Hewa and Baktaman are larger and often consist of two families under a single roof. Sexual segregation is not as complete as among the Duna and men and women share opposite sides of family dwellings with only an imaginary line separating them.

In an historical perspective it may be that a "struggle" has been waged in which the principles characteristic of lineages have gradually come to dominate over the principles characteristic of domestic groups. Certainly, the dominance of lineage principles over domestic principles represents an overcoming of that tendency to production for domestic use only, which Sahlins saw as the fundamentally anti-social feature of the domestic mode of production. Dominance of lineage-based relations of production should amount to a freeing of the "fetters" imposed on production by domestic production for consumption. So far as the Duna

3-

216.

are concerned, domestic-based relations and lineage-based relations appear to be balanced in a state of equilibrium. The inability of lineages to hold their members and thereby increase demands for appropriation of surplus from individual domestic units is, I think, a key to understanding the relatively low level of production-intensification among the Duna by comparison with the Enga and Hagen peoples. But it should not be overlooked that intensification through increasing emphasis on agnation is apparently only bought at a price: the increasing denial of the freedom of individual to produce for themselves and their families, contributing to their lineage(s) only what they think appropriate.

/14/ Can Exploitation be Demonstrated?

Can the exploitation of women by men be quantifiably demonstrated, in the same way that Marx demonstrated the appropriation of surplus-value from the direct producers by a class of non-producers under capitalism? Given the quantified estimates of labour time presented in section /10/ it seems reasonable to attempt the project. However, since my estimates of labour-time in Duna horticultural production are on the basis of the sexual division of labour alone, and because I have no information indicating that women living with their brothers work less than women who live with their husbands, any demonstration of exploitation here must be made in terms of men and women (whether married or unmarried) as the two primary classes in relation to the productive forces. Whether or not women are married, their labour is always under the control of a man. If a husband attempts to extract too much labour, a woman can always return home to her brothers, but they have no reason to extract less. Unlike Duna lineages, which maintain no co-ordinated relationships among themselves at the group level, individual Duna brothers-in-law are always linked through contractual relations of exchange, founded upon the alienation of women's sexuality by means of bride-price. Thus, while the freedom that men have to live with the lineage of their choice entails the possibility of moderating the demands of the lineage upon the surplus-production of the homestead, the freedom of women to live either with their husbands or their brothers does not seem to offer an equivalent check upon exploitation.

Moreover, men have coercive force on their side in furthering their common interest in maximising women's productivity. Whereas the men of a lineage can legitimately beat one of their own members for violation of the rule of exogamy, and little else, both husbands and brothers can legitimately beat their wives/sisters without fear of reprisal in all matters concerning disobedience, inattention to production, and sexual infidelity. Even *ima luali* are subject to this form of coercive inducement to production. The only limit on the use of coercive force against wives and sisters is that the man who exercises such force must pay compensation if the woman is seriously injured, dies or commits suicide. If a married woman is living with her brother and hangs herself, the brother must pay *damba* to the husband; or if she is living with her husband, then he must pay *damba* to the brother. Therefore, it appears that the conditions under which the sexuality of women is alienated through bride-price create circumstances conducive to the exploitation of all women, whether or not they marry or live with their husbands.

With this qualification made, we can return to the estimated hours of labour involved in Duna horticultural production according to the sexual division of labour. I have shown that the estimated *contributions of men and women according to the division of labour in the first cycle of a .5 ha garden are:

First cycle operations:	Men	Women	Total
Site preparation	1758 hours	167 hours	25 - 1
Planting and harvesting	67.5 hours	1380 hours	
Totals	1825.5 hours	1547 hours	3372.5
Hours labour as percentage of total	54%	46%	

The male labour necessary to establish a new garden in primary forest and carry out the first cycle of cultivation is therefore slightly in excess of the female labour required. However, the proportions of labour expended by the sexes are very different in subsequent cycles:

Operations in each subsequent cycle:	Men	Women	Total
Fence maintenance	10 hours		
Re-mounting, planting and harvesting	67.5 hours	1192.5 hours	-
Totals	77.5 hours	1192.5 hours	1270.0
Hours labour as percentage of total	6%		

1.4

If an average Duna garden passes through six mounding cycles before abondonment, it can then be calculated that the total labour and its proportional allocation between the sexes amounts to:

		Men	Women	Total	
First Cycle		1825.5 hours	1547 hours		
Subsequent cycle	s (x5)	387.5 hours	5962.5 hours		
Totals		2213 hours	7509.5 hours	9722.5	
Hours labour as of total	percentage	23%	77%		

Consequently, by extending the number of cycles of cultivation through the mondo system of mulched, labour-intensive cultivation, the total contribution of male labour in horticul_tural production declines relative to female labour. The more cycles a garden can be put through, the greater the percentage contribution of female labour to the production process.

On the basis of published information, similar estimates of the labour contributions by the sexes can be made for other horticultural systems in the Highlands:

Table 14:1 Sexual divisio cultivation sy	n of hours of stems	labour in High	liands
	x 4 - 4 - 4		<u>- 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10</u>
System:	Total hours per ha	Contribution as percentage of total hours of labour	
		Men	Women
Kapauku bedamai, first cycle	5051	59.5%	40,5%
Kapauku extensive shifting	2928	55%	45%
Kapauku bedomai, six cycles	22046	-54.5%	45.5%
Duna mondo, first cycle	6745	54%	46%

System:	Total hours per ha	Contribut of total	ion as percentage hours of labour
· · · · · · · · · · · · · · · · · · ·		Men	Women
Kapauku intensive shifting, first cycle	3320	438	578
Maring extensive shifting	5634	248	761
Duna mondo, six cycles	19445	238	778
Kapauku intensive shifting, four cycles	7986	228	78%
Raiapu mondo, continuous cycling, per cycle	4231	81	92%

Viewing the varying proportions of male and female labour in these different production systems, it is possible to offer a new interpretation of the phenomenon of labour-intensive horticulture in the Highlands. I reached the conclusion above (Section /10/, p.165) that labour-intensive cultivation practices offer rewards of increased productive efficiency in return for increased labour-inputs. A problem (not noted at that point) emerges: if productive efficiency can be increased by the simple act of investing more time-and energy in cultivation, why haven't all Highlands systems developed into labour-intensive systems? Brookfields initial argument suggested that they should, that additional productive efficiency was always available whenever people had additional labour to invest in their horticultural system. In his model it was assumed that hours of labour per capita were constant, so that population increase due to natural demographic growth provided the engine of change that produced the added labour which resulted in intensification. But there are several objections to this view.

To begin with, a population does not need to increase total labour in order to move to a more efficient production system. For example, the Kapauku could produce their sweet potato requirements with less labour if they abandoned their inefficient extensive shifting cultivations on the hillsides and added to their *bedamai* cultivations in the flat country about their villages. A comparison /14/

of Pospisil's maps (1963a: figures 23 & 24) shows that a considerable expansion of bedamai was indeed possible for the villagers of Botukebo between 1954 and 1959, (although it might be that soil fertility will eventually suffer from the decrease in bedamai fallow periods). For that matter, the Kapauku could even abandon bedamai cultivation and gain further efficiencies by employing the intensive shifting method alone (although in that case there would probably not be sufficient land, and the labour expended in site preparation would be lost at the end of each sequence of intensive shifting cultivation cycles, instead of converted into an initial stage of less efficient but more lasting bedamai). Or, to take another example, the Duna could produce their horticultural requirements with less labour if they expended more labour per ha in Enga-style mounds. (Unlike the Kapauku example, this assumes that Enga mounds would be suitable in the Duna environment.) In both cases, no increase in population or total labour would be required to bring about greater productive efficiency and production-intensification. The amount of labour formerly invested in inefficient cultivation would be invested in a smaller area of land to produce a greater total yield.

Again, even were an increase in absolute labour necessary for a society to move from a less to a more efficient technology, there are reasons to suppose that no increase in population is required to produce an increase in labour input. The data and computations of Section /10/ provided some evidence that the hours of labour per capita which Highlanders put into subsistence activities vary in different societies. The Kapauku put in 2.3 hours of horticultural work a day, while the Raiapu Enga put in 3.3 hours (not to count the 1.7 hours per day they put into commercial crop production, marketing wage labour, council work and other work external to the subsistence sector -- see Waddell 1972: 101, Table 25). The Raiapu were, however, carrying a large number of pigs in preparation for their Te ceremonial exchange, while the Kapauku had just finished their pig festival. At the estimated peak of each society's pig cycle it appears that Highlanders average around 3.4 hours of horticultural work per day, regardless of their level of productive efficiency.

But the Kapauku and Raiapu have pig cycles with a periodicity of ca. 3-5 years, while the Maring and Duna have cycles with periodicities somewhere between 5 and 20 years. So the Raiapu and the Kapauku work at full-pace more often during their lives, demonstrating that the intensity of labour use is variable between societies. Even if it could be shown that an absolute increase in labour-inputs is required to shift a technology to a more productively-efficient level, it still does not seem necessary to suppose that population increase is required to produce an increase in labour.

There thus seems to be no reason for the preservation of landextensive and productively inefficient systems, unless one or another of Brookfield's initial assumptions is invalid. It may be, for example, that the assumed principle of least effort does not apply: perhaps it is the case that despite generations of practice, Highlanders are unable to perceive marginal returns to inputs. That is, perhaps they cannot "see" that harvest rewards increase more rapidly than labour-inputs per unit of area. Or perhaps people really are inhibited by the state of their technological knowledge, such that the cultivators in each society cannot realise that additional labour input will produce any increase in harvest output, let alone a productively advantageous one. In that case, the rate of diffusion of more efficient techniques from their places of invention would presumably be the determining factor in each society's cultivation practices. Such an explanation would not, however, explain the simultaneous existence among the Kapauku of techniques with different degrees of efficiency, particularly since the Kapauku employ their least efficient techniques the most and their most efficient techniques the least.

A third possibility may have to do with a conceptualisation problem of a different order: it may be that people in societies employing less efficient methods are unable to think about production efficiencies in the longer term, that is, in terms of enough cycles in the future to reap the benefits of efficiency accruing from initially greater efforts in preparing garden sites. Table 14:2 sets out the relative efficiencies of the different systems under Comparison of productive efficiency (kg/hour of labour input) in Highlands cultivation systems, first cycle and cumulated efficiency over typical period of continuous cultivation

	hrs/ha -		kg/hr -	hrs/ha -	kg/hr – average under
System.	first cycle	t/ha/cycle	first cycle	cultivation	continuous cultivation
: 1.					
Maring extensive shifting	5,634	15.53	2.76	5,634 (1 cycle only)	2.76
Kapauku extensive shifting	2,928	8.13	2.78	2,928 (1 cycle only)	2,78
Duna mondo	6,745	13.62	1.96	19,445 (6 cycles)	4.20
Kapauku bedamai	5,051	16.90	3.35	22,046 (6 cycles)	4.60
Raiapu mondo (cor	ntinuously cycled)	20.06	1 - 1 - 1 - 1	4,231 (any one cycle)	4.74
Kapauku intensive shifting	3,321	13.81	4.16	7,986 (4 cycles)	6.92

Table 14:2

14/

223

consideration, both at the completion of the first horticultural cycle and as average efficiencies over the number of cycles assumed typical in each system. From this table it appears that a Kapauku or a Maring practising extensive shifting cultivation would recognise nogain in efficiency to be had by investing additional labour/unit area in a Duna mondo system, so long as the problem were viewed in the short-term perspective of a single garden cycle only. It is only when the mondo system is operated over several cycles or converted with additional labour into a continuous-cultivation Enga system that initially greater labour-inputs/unit area are rewarded with greater productive efficiency.

This last explanation for the preservation of inefficient techniques, due to inability to think about production over the long-term, is an attractive one. It fits with the many popular notions of the deferred gratification pattern as an integral part of bourgeois rationality, as well as with what is known of the concept of time among primitive peoples. Whereas the archetypical notion of time among hunter/gatherers is the aboriginal Australian "dreaming" (Stanner 1968) in which all pasts and often all futures as well are conflated together into a single moment of other-than-the-consciouspresent-of-here-and-now, it is among horticultural and agricultural peoples that one finds the first attempts to grapple with the notions of passage of time and its extension into the future, such that future-time does not meet itself in the past in a self-devouring endless cycle (cf. Evans-Pritchard 1939; Leach 1953; Meggitt 1958). Horticultural and agricultural food production in fact both require and at the same time generate in the minds of men the concepts of time necessary for the operation of the production cycle. By this reasoning, the adoption of productively efficient horticultural techniques in the New Guinea Highlands may have depended in the past on the development of cultural notions of deferred gratification and Perhaps it is only to the extent that future-oriented planning. people have been able to understand and accept that effort in the present can produce increased rewards over a future period of several years, that they have been able to adopt more labour-intensive and

efficient systems of cultivation.

But consideration of the proportional contributions of men and women to different systems of horticultural production in the Highlands suggests another possible explanation for the phenomenon of retention of inefficient systems. Consider the three Kapauku systems of cultivation first, since they have proved most resistant to explanation so far. Almost 60% of the labour of preparing a bedamai garden and completing the first cycle is male labour. From the point of view of Kapauku women, a system of bedamai gardens operated for a single cycle only would be most advantageous. But from the point of view of the men, a system of repeated bedamai cycles not only conserves their initial efforts in establishing the gardens, but transfers more of the burden of horticultural labour onto women. Men might be expected to favour such a system, although it might also be expected that women would offer resistance to its wide-spread adoption. The situation is even clearer when the least efficient system (extensive shifting cultivation) is compared with the most efficient system (intensive shifting cultivation): on the basis of the first cycle alone, women's share of labour rises from 45% under extensive cultivation to 57% under intensive shifting cultivation. If an intensive shifting cultivation garden is operated through four cycles, the share of female labour allocated by the sexual division of labour jumps to 78% of the total. Could it be, then, that it is the inability of Kapauku men to extract such unequal contributions of labour from women that prevents the Kapauku as a whole from utilising their most efficient production system for more than the smallest portion of their production needs?

There are certain observations made by Pospisil which suggest that this may indeed be the case. On the basis of observation and computation, Pospisil (1963a: table 9) shows that among the Kapauku the men perform a slightly larger proportion of the total horticultural labour (all systems taken together) than do the women. Yet other data and calculations (1963a: 188 - 191) suggest that the best indicator of the amount of ground that a Kapauku household /14/

will have under cultivation is the number of married women in the household. Pospisil Interprets these findings: although Kapauku men do more productive work than their women, the amount of work that a man can do is effectively limited in their cultivation system(s) by the availability of female labour. Women's labour is vital in the operations of planting, weeding and harvesting, and it is these operations which appear to be the bottleneck in the system as a whole, the "fetter" which restricts the expansion of production. Thus, to carry Pospisil's interpretation a step further, it appears that the level of intensification and horticultural production in Kapauku society is determined by the inability of the men to extract more labour from their women. It is their social relations of production, rather than any factor of technology or population or environment which seems to restrict production to the ethnographically observed level. Moreover, we may say that in a sense it is the women who hold the upper hand in this society (leaving aside the crucial matters of distribution and consumption of the product): so far as relative contributions to production are concerned, the women are obliged to provide less labour than the men.

Similar considerations apply in the case of the mondo systems of the Duna and Enga. Initial preparation of a Duna garden site from primary forest requires a 54% contribution of male labour to the completion of the first cycle. But each successive cycle of mounding increases the proportion of female labour. To realise the productive efficiency of the system, six or so cycles must be completed in each garden. Six cycles increases the contribution of female labour from 46% to 77%. Men now have the upper hand, Transformation of extracting surplus productive labour from women. the Duna mondo system, with its small, lightly composted mounds, into an Enga system of large mounds with more composting and generally more preparation labour, would require that women carry 92% of the work of direct production. Although the inequalities of the Raiapu system are considerably modified by the added efforts of men in extensive shifting cultivation yam/mixed gardens, it would still appear that the intensification of labour-input, the intensification

of horticultural production output, and the intensification of exploitation of female labour are all directly related to one another.

227.

The Maring case is an interesting and difficult one, because it seems to show that a land-extensive and relatively less-productive system can still appropriate a large percentage of female labour. Since my estimations are based on Rappaport's (1967:table 4) data for Tsembaga sweet potato/sugar.gardens, that is, the type of garden made by the Tsembaga when surplus production is at a premium due to the planned-for approach of a pig festival, this is not entirely But as I have noted, there are doubts about the surprising. usefulness of Rappaport's data for these purposes here. Apart from the difficulty of converting estimates of caloric expenditure into estimates of time, Rappaport's description of the division of labour is not as complete as might be wished. Without further analysis and data I cannot make up my mind about the Maring, though it seems to me that they may be an example of a society with relatively inefficient technology in which men have nevertheless gained the capacity to extract surplus-labour from women (at least every 5 to 15 years or The next logical step for so, when they have their pig-festivals). Maring men might then be to shorten the interval between festivals and introduce a mounding technology (perhaps at a slightly higher elevation in their mountains) in place of their present inefficient extensive cultivations.

The Maring case aside, the increasing proportion of women's labour involved in the production of the direct means of subsistence and surplus appears to be a correlate within the relations of production of the intensification of horticultural production, both in terms of labour input and production output. The more that women work in gardens, and the less time that men have to spend in preparing the garden sites, the greater is the amount of surplus produced by the horticultural system. This surplus is appropriated by men through their structural dominance, based upon the alienation (in varying degrees) of female sexuality in the marriage system. The more that men are able to separate women from their own means of

/14/

production via mechanisms of bride-price and exogamy, the more they are able to command their labour in increasingly unequal systems. The more unequal the system, the greater the intensity of production. Part of the increased productivity is due to increased hours of labour, but more clearly, increased productivity follows from an increase in female labour-inputs which raise the productive efficiency of the cultivation system.

An interpretation of the Kapauku system

Seen in this theoretical perspective, the Kapauku production system still appears somewhat an enigma. On the one hand it appears that the productive forces among the Kapauku are at a lower stage of intensity than among the Enga or the Duna, and this is consistent with the low proportion of women's labour incorporated in production. But on the other hand the Kapauku practice intensive forms of cultivation (bedamai) and operate a highly developed exchange economy based on an elaborate system of shell "money" tokens combined with a developed number system for counting and "bookkeeping". Geographers (particularly Waddell 1972) have perhaps misunderstood the Kapauku by failing to appreciate the relatively small proportion of cultivation In a like manner the existence of carried out by intensive methods. a monetized system of exchange might perhaps mislead anthropologists into supposing that the production system represented by the exchange The reality is that Kapauku system was highly developed as well. shell-money is somewhat akin to the inflated-value play-money of a make-believe game. The amount of pork or pigs, women, houses, cances, and other capital goods that Kapauku can buy with their money is probably considerably less than the Duna could "buy" with their I estimate that the Duna in fact had a ropes of cowrie shells. sufficient supply of cowrie shells (dange) to develop a monetary and exchange system as elaborate as that of the Kapauku. That the Duna have not done so, that they have kept their counting and number system at a less developed level and treated ropes of cowries as "pigs" instead of the other way around, I am inclined to attribute to the

real potentials for increasing production which still operate in their environment.

The Kapauku seem to lack the means for effecting any great increase in real production. Judging from Pospisil's photographs, their physical environment is relatively impoverished or depleted of potential. The original potential energy of primary forest has broken down into a lower potential of secondary regrowth and grassland, closer to final entropy (see Clarke 1971:183ff. and Appendix A for the entropy concept in human ecology, following Fosberg). Perhaps this is a consequence of a longer history of human occupation in West New Guinea than in the east, or of the operation of a previously more intense system which has over-reached the capacity of the environment to regenerate. Combined with the "low-energy" environment we find a system of relations of production that apparently does not allow men to extract surplus-labour from women. (We know this from the sexual division of labour. Empirical investigation is still required to determine how it is that Kapauku women are able to avoid the exploitation practised upon their eastern sisters). The Kapauku system is thus doubly lacking in The elaboration of the the means to increase real production. Kapauku monetary system and the expansion of their monetized system of social and commodity exchange (even to the point that accurate accounts are kept of who owes how much as between husband and wife and parent and child!) is then perhaps understandable as an instance of system-involution (cf. Geertz 1963) in which the system of social exchange is involuted rather than the production system itself. It seems as if the Kapauku, being both environmentally and socially powerless to expand their real production, have turned instead to an intellectual elaboration of the system of tokens and counters that represents their productive wealth. Unable to produce more in the way of real value, their social formation is characterised by a Real values are production of mystifications based upon wealth. converted into valueless abstractions, quantities of money, "fetishisations".

/14/

The most successful mystifiers in Kapauku society are the political leaders. As the headmen of the village studied by Pospisil said in speaking of generous men (those who return real values rather than monetized exchange-values:

"They can have their praise and respect, I do not care for them. I prefer to collect and lend the money. This way one becomes rich and the debtors are dependent anyway. I am a headman not because the people like me but because they owe me money and are afraid" (Ijaaj Awiitigaaj, quoted by Pospisil 1963b:63).

But however much this may be reminiscent of a Machiavellian spirit of capitalism (the capitalism of an historian like Pirenne, concerned with renaissance commerce and trade more than with the appropriation of surplus-labour), the mystification of the Kapauku elaboration of monetization is not dominant in the last instance, (as it is with capitalism under the formation of the state). Pospisil tells us:

Wealth by itself, however, does not make a Papuan a leader of his people Selfish and greedy individuals, who have amassed huge personal properties, but who have failed to comply with the Kapauku requirement of "generosity" toward their less fortunate tribesmen may be, and actually frequently are, put to death Even in regions such as the Kamu Valley, where such an execution is not a penalty for greediness, a non-generous wealthy man is ostracised, reprimanded, and thereby finally induced to change his ways (1963b:49).

As Harris (1971:258ff) proposes in his critique of the notion of Kapauku "primitive capitalism", the difference lies in the nonexistence of a state. The Kapauku rich man cannot dominate in the last analysis because be cannot indefinitely mystify his fellows into acquiescing in the expansion of his personal wealth:

.... because in New Guinea, and elsewhere, men do not voluntarily suffer poverty in order that others stay rich. A stingy redistributor in a stateless society is a contradiction in terms for the simple reason that there are no policemen to protect such people from the murderous intentions of those whom they refuse to help (Harris, p.261).

The case for the appropriation of surplus-labour by men from women in Duna society now appears complete. The intensification of horticultural production which has made possible the production of an increased surplus of pigs rests upon an increased exploitation of

* * *
4.7

women's labour. The conditions of this exploitation have been reasoned to be not the direct and *de jure* relations of collective domestic production, but the covert, *de facto* relations of sexuality, resting upon the all but denied ownership of sexual access to women. Although I have not been able to show precisely how this domination over women permits their exploitation to the extent of some 77% of the labour of direct production, while other relational structures in other Highlands societies permit greater or lesser degrees of exploitation, a connection nevertheless seems to exist within the object of theory. An examination of marriage relationships in Kapauku and Enga society would no doubt clarify this further.

But, at the risk of undoing the entire analysis, the men who are here accused of exploiting female labour must be given their say. When I have questioned Duna men about the obviously longer hours of women's garden labour, they have replied in effect that the work was still equal, since men's work was harder. Women, they recognised, worked longer hours, but their work did not require so much exertion and what really matters in the end is the extent to which "hard work dries up your grease".

To evaluate this claim it is necessary to make some simplifying assumptions concerning caloric expenditure in subsistence activities. Since I have no direct field observations, I have adopted the values suggested by Rappaport's study (1967:Appendix 5, based mostly on the work of Hipsley and Kirk 1965 among the Chimbu) and assumed that heavy labour requires the expenditure of 2.8 calories per minute above basal metabolism, while light work requires 1.5 cal/minute on average. On this basis, I estimate the caloric expenditure required in the clearing and subsequent cycling of a Duna forest garden of .5 ha (Table 14:3):

Netter Le là surge bluir treum, En 1111 - Le con-

the second state and a second of the second s

147, how on young the left of the state of the state of the

al rees

1.00

First cycle:	- 11			and a stand of the stand of the
Operation	cal/ minute	Men's labour	(cal.)	Women's Labour (cal.
a venta or re-	are workerson	Permeran Ingente		
Felling trees	2.8	24192		
Fencing	2.8	12096	1.	
ollarding	2.8	7056		1 -
reaking soil	2.8	252000		-
learing refuse and burning	1.5			15030
lounding	1.5	<u> </u>	· · · ·	60750
lanting	1.5	- · · · ·		18900
leeding	1.5		** <u>*</u> **	10125
st harvest	1.5	4050		22950
and harvest	1.5	2025	- 1.	11475
otals:		301419	+	139230 = 440649
		(68.4%)		(31.6%)
	annum and and		* 3	
econd and subseq	uent cycles			and the second s
ence maintenance	E Barrier Barr	1680		1
e-mounding, plan	ting	 A grant (and the constraint of the		
and harvesting	-	6075		107325
otals:	ed united a	7755	+	107325 = 115080
Carrier and the second	per anyles	(6.7%)		(93.3%)
otals for six cy	cles:	340194	-i e= +	675855 = 1016049
		(33.5%)		(66.5%)

Table 14:3 Estimate of caloric expenditure

Thus far it appears that women are still being exploited. However, because young girls are able to perform productive garden work at an earlier age than boys, it needs to be remembered that there

B. To

5.5

of 2.56 calories/minute of 1.5 calories/minute

/14/

are effectively more female gardeners available to do female work than there are male gardeners for male work. I have assumed (on the basis of impressionistic observations) that girls less than 11 years of age do not contribute to gardening, while girls of 11 and 12 years of age are able to perform 80% of the work of their elders. Females from 13 to around 60 years of age I count as one "worker unit" each, and those over 60 as fully dependant. For males I assume that boys under 11 are fully dependant, that boys of 11, 12 and 13 years of age perform the work of .5 "worker unit", that boys from 14 to 20 are equivalent to .8 "worker unit" each, that men from age 20 to 54 are one worker unit each, that men aged 55 to 59 perform the work of a half unit each, and that men 60 and over are fully dependant. My estimates of the contributions of adolescent boys and girls to production are as much a matter of how much their elders are able to coerce them as of their intrinsic capacities. On the basis of these assumptions, the sample of Horailenda homesteads (table 8:6 consisting of 157.5 residents provides the equivalent of 48.8 male worker units and 59.25 female worker units. (There are fractional residents and further fractions of worker units because I have allowed for habitual part-time residents who divide their work efforts and sleeping time regularly between two or three different homesteads).

Since I have estimated that Duna cultivation methods supporting the current pig and human population require 1.2 hours of horticultural labour per capita per day (Section /10/,note 6), it can be assumed here that 157.5 people will require 189 hours of garden work per day. From p. 219, above, 23% (= 43.5 hours) is male work while 77% (= 145.5 hours) is female work. Therefore, 48.8 male worker units perform .89 hours/day/worker unit and 49.25 female worker units perform 2.46 hours/day/worker unit. On a caloric basis this is equivalent to 53.4 minutes of male Tabour at 2.56 calories/minute = 136.7 calories/day per male worker unit, and 147.6 minutes of female labour at 1.5 calories per minute = 221.4 calories/day per female worker unit above basal metabolism. It still appears that women are being exploited (on the assumption that they put more than half the productive effort into the production of a surplus which is jurally defined as belonging equally ("half-side - half-side") to men and women together). Moreover, this exploitation is in addition to any notion of exploitation that might be suggested by the longer span of years during which women are active as gardeners. However, within the theoretical framework here, the assumption of different effective age-spans for male and female garden work would seem to be a matter of "from each according to his ability" and is thus probably not a form of exploitation in itself. In any case, adolescent boys spend much of their time trapping birds and learning to hunt, thereby contributing at least to their own self-subsistence if not to the subsistence of others.

However, as men will point out, there are other subsistence tasks in addition to garden work that must be performed for life to go on. To give due consideration to the men's claim that workeffort is equally divided in Duna country, it is necessary to account for these other forms of subsistence labour as well. On the basis of Waddell's (1972:table 25) timed observations of all subsistence tasks among the Raiapu Enga, combined with my own subjective observations taking into account differences in local conditions and somewhat different patterns in the division of labour outside of garden work, I have arrived at the following estimates:

Table	14:4	Mean time per worker	per	week,	subsistence	activities	
	30	other than gardening					
The second		and the second s			11	10	1

Activity:	Men - hours/week	Women - hours/week
House construction	2.0	.2
Manufacture of tools, net-bags, etc	. 2.0	2.0
Cooking	4.5	4.5
Firewood	1.6	0.4
Travel to and from gardens	3.5	4.0
Hunting/gathering	2.0	1.0
Totals:	15.6 hours/week	12.1 hours/week

/14/

Thus men evidently contribute a few hours per week more than women to the performance of essential subsistence tasks outside the garden. Building houses and felling dead trees for firewood are their chief contributions to the joint welfare of the members of the homestead, while the only significant contribution to joint welfare made by women outside of gardening is in the extra time they expend in carrying home sweet potato for pigs and children.¹ However, typical male activity patterns often require men to make twice as many trips to and from gardens than do women, so although women must take more time on their return trips due to their heavy burdens, the total time difference between the sexes is probably not very great.

235.

Finally, there is some uncertainty about including time spent in hunting and gathering in the computations. Not only are these estimates little more than guesses, but the proceeds are often not Ideally, game and the other shared equally between the sexes. products of the forest should be shared between the sexes within the homestead on the basis of either commodity exchange (yoloya) or reciprocal social exchange (piatsaiya, "helping"). For example, a man may give his wife pandanus nuts in direct exchange for a net-bag she has made, or he may give her a marsupial in the expectation of a delayed reciprocity, perhaps in the form of bundles of greens or wild mushrooms, or prepared bark twine, or even sexual favours (which are not quite the same as the sexual access obtained through bride-price). But in practice men often cook and eat the game they catch before arriving back at the homestead, and women often gather foods which men say "gives them the creeps", so that sharing does not always take place.

To arrive at an answer to the men's claim that work-effort is equally divided, it is necessary to convert subsistence activities other than gardening into caloric expenditure estimates:

the souther of the second

Activity:	cal./m	inute	Men's labour (calories/week)	Women's labour (calories/week)
revising the pipe	and Patheore			
Gardening	men: women:	2.56	957	1547
House construction	men: women:	2.0 1.5	240	18
Manufacture	both:	1.0	120	120
Cooking	both:	1.0	270	270
Firewood	men: women:	2.8 2.5	269	60
Travel	both:	2.5	525	600
Hunting	men:	2.0	240	- Bu
Gathering	women:	1.8		108
Iotals:		No The	2621 cal./week	2723 cal./week
	o			Grand total = 5344
the aller of the second	ing takes		(49%)	(51%)

Table 14:5 Estimate of total caloric expenditure in all Duna subsistence activities, per worker per week.

Considering the reasoning that has been advanced in support of the hypothesis that men are able to dominate women in the production process and thereby extract surplus-labour from them, this final result appears little less than astounding. Can it really be that Duna men are right, that the work of domestic production is shared equally between the sexes on the basis of work effort, and that there is therefore no exploitation within the production process, since the product is jointly owned by the men and women of the homestead as a common result of their equal and combined labour? Of course the presumed caloric expenditures in the different branches of production are only crude estimates, but the estimated totals nevertheless seem too close together to be due to chance errors of estimation. How can this apparent equality of labour in overall subsistence production among the Duna be accounted for?

A characteristic her weeks and the other of the best of the second of the second of the second of the second of

LEAD SARASE TONIES OF WORKS HOUSE SUCCESS SUCCESS SUCCESS STATES

20

compl)

Although Duna themselves rarely speak (or think) in terms of relational propositions, let alone relational propositions in quantified terms, I can nevertheless imagine a sophisticated Duna man explaining equality of labour between the sexes in somewhat the following terms:

Men and women both work the same in doing gardening and rearing the pigs. Men do hard work: chopping trees and building fences and breaking the soil. When their work is done they can sit down in the shade and rest. Women's work is not so hard. Mounding sweet potato and weeding and harvesting is their hard work, but it is not really as hard as men's work. So women work on when the men's work is finished. They are not tired yet. When they finish work they can sit down too.

Some women don't listen to men; they are lazy and run away instead of finishing their work in the garden. Other women, good women, do as they are told. They think of their sweet potato mounds and their pigs. They mound more and more, so that they have plenty of sweet potato. Other men give them pigs to look after. They have plenty of sweet potato to give to visitors and they tend many pigs, which are half theirs too.

Men are the same: some men don't listen; they run away and don't think about their gardens. Other men are truly gardeners. All the time they think about gardens and they are always chopping trees and clearing new gardens.

Men tell women what to do, and women can listen. If the men think good, then their work can go ahead and there will be lots of sweet potato and more and more pigs. But the men's work can't go ahead of the women's work, and the women's work can't go ahead of the men's. How is this? Suppose the men work hard and clear gardens, but the women are lazy. They don't make enough mounds and there isn't enough sweet potato for the pigs. All right, it's the same if a woman works well but her husband is lazy. Then there is not enough good ground in the garden for mounding. She'll mound her husband's garden completely, and then she'll go and work in her brother's garden, but her husband won't be able to raise many pigs. How? Because his work isn't right, the sweet potato in his garden is small and not enough.

This is, of course, a purely imaginary Duna explanation. I know that men complain that women neglect their tasks, and I know that women sometimes complain that their husbands provide them with inadequate garden sites, but I have never heard anyone explicitly propound a mutual interrelationship between quantities or rates of men's and women's work. In the normal course of events women mound enough sweet potato to

237.

W. There are

effectively utilize the garden sites prepared by men, while men prepare garden sites at a rate to match the mounding capacities of the women. The amount of work that each sex performs seems intuitively adjusted so that neither side gets out of phase with the other. By this reasoning, the exploitation of one sex by the other within a system of joint production based on a sexual division labour seems to become an impossibility. Since the production of pigs depends on the performance of two separate task-sets in combination, and since a surplusperformance of one task-set cannot increase total production without a matching surplus-performance in the other (complementary) set, exploitation within production appears an impossibility. It does men no good to prepare larger garden sites than women can mound, and women cannot mound areas any larger than the men have previously prepared.²

So it seems that exploitation within domestic production is an impossibility, as long as production is truly joint production, requiring the combination of different labour processes in specific proportions in order to produce a single product. At this point I cannot help but recall Levi-Strauss' (1958) reply to Revel on the question of exploitation in primitive societies. Levi-Strauss quoted Engels (1882): "It just proves how at this stage the type of production is less decisive than the degree in which the old blood bonds and the old mutual community of the sexes within the tribe have been dissolved", and he adds that Engels understood it would be useless to attempt to uncover the conditions of a mode of production within these societies.

However, the argument which I have just outlined (and attributed in a sense to the Duna) is an argument that assumes—as Duna tend to assume—the immutability of the sexual division of labour. That is, it assumes that there are tasks appropriate to each sex, and that these tasks in some determinate combination result in the efficient and equal contribution of both sexes to the production process as a whole. Now, although there would seem to be some biological basis for division of labour among the Duna on the basis of sexual dimorphism, such that women cannot perform strenuous tasks as effectively as men, not even the Duna would argue that men are biologically incapable of performing

Indeed, as already noted, some men perform all production women's tasks. tasks without female assistance. So it may be asked, why is it that men don't help women with the mounding of sweet potato after they have finished their masculine tasks of garden-site preparation? The answer, apparently, is that men don't do women's work to equalize total hours of labour between the sexes, since to do so would be to make energy contributions unequal. The existing arrangement of the division of labour not only allocates strenuous tasks to men and less strenuous work to women, but it also divides the total work of subsistence such that men and women each expend the same total amounts of energy. The allocation of the total complex of subsistence tasks could be arranged differently, so that the hours of labour would be equalized between the sexes, but then their expenditures of effort would be unequal. Either women have to be exploited of their time, or men of their energy. Is there no way by which the Duna could equalize both time and energy between the sexes?³

Such an equalization could be achieved on the condition that productive efficiency, the intermediate factor between time and energy, could be varied among different branches of production by changes in technology and capital investment. For example, consider the case of the stone axe. An axe represents both a capital investment necessary for production to commence (a good blade is worth a large pig) and an instrument of labour interposed between the labourer and the object of labour (a tree to be felled, say) such that a certain productive efficiency is realized. Although we do not have the analytic means of comparing the contribution to production as a whole of felling trees with, say, weeding sweet potato mounds, intuition suggests that the productive efficiency of axe-work is probably greater than the efficiency of weeding with bare hands and digging stick. If we suppose that a similar disparity in productive efficiency is typical of all tasks according to the sexual division of labour, we come to a conclusion: male labour in combination with greater capital investment and technological development is able to contribute more to production as a whole than can female labour (since the latter is under-capitalized and technologically underdeveloped). This means that men can complete their part in the total production process with either less energy expenditure, or less time, or

239.

both. It can be argued that women have been exploited because their branches of production have been left under-capitalized; but it can also be argued that the flaw lies in technology itself, that labour-saving devices for the mounding, weeding and harvesting of sweet potato are not so easily invented or acquired as are labour-saving devices for the felling of trees.

But if my estimates of energy expenditure in subsistence tasks are accepted as substantially correct, it appears that whatever advantages in productive efficiency Duna men actually have, their advantages are only able to save them time, not energy. Were it otherwise, a case for exploitation would be clear. With both time and energy saved in their own tasks, men would have no excuse for not helping women until either labour hours or labour energies were made equal. But as it is, it is not even clear that men's work really does involve a greater productive efficiency. Women carry out their tasks with the aid of wooden spatulashovels (now steel), digging sticks, net-bags, pig-ropes, the houses they and their pigs live in, etc., and all of these are capital investments and productive instruments of labour. How can we really know if the contribution of axe-work to the final product is any more efficiently realized than the contribution of hand-weeding? Taking the division of productive labour as a whole, perhaps shorter hours of male labour have nothing to do with greater productive efficiency. Perhaps they follow simply from greater male exertion per unit of time. Perhaps strenuous exertion provides the most efficient mode for the felling of trees, while a prolonged moderate and evenly-paced effort provides the most efficient mode for the pulling of weeds?

the cost is to be a set of the se

built (Ling) And becore, A. Jul

some at thet.

VICTOR LEVE ADD WILL DELADE SO IN THE PARTY A

Decision mereland, longit contraction to the traction

traily marks the stor in this way. She had not

the start fries the platence, of acquinterplate rates and them to the

÷ 1

/15/ Time, Energy and Consciousness

Finally, it seems necessary to come to a point of general theory. In demonstrating the appropriation of surplus-labour (and surplus-value) under capitalist wage-labour, Marx (*Capital I*) based his quantifications upon hours of labour rather than energy expenditure. Since industrial production involves different processes with varying degrees of capitalisation and varying productivity in relation to work input, and since the wage-labour system itself assesses wages primarily in relation to hours of labour and not on the basis of energy expenditure, Marx's approach seems appropriate to production under capitalism. But within the horizons of primitive horticultural production with little but the most rudimentary technology and capitalization, the bourgeois consciousness that "time is money" appears almost meaningless. As Paliawi of Horaile' explained to me:

Before the whiteman came, we really didn't know about time. Our ancestors told us we would live for ten generations; then we'd be finished. The soil would be red and sweet potato would be small only. Children would be born with grey hair, and they would be so small and weak that even the stunted shrubs of the *yango* (regrowth) would seem like great trees of the forest to them.

Our ancestors told us that the sun made everything. Pandanus, sweet potato, yam, sugar, men and women, children, pigs, trees, everything, ... the sun put them here. The sun is a man; the moon's a woman. Only the sun put things here. Before, we always wondered where the sun went at night. We saw that the sun and moon always came up on the same side of the sky-mountains. But where do they go when they get over to the other side? Do they go under the ground, or do they trick us and somehow go back again? Now the whiteman has come, and he has a wristwatch. The whiteman knows what the sun does. His watch says 'five' in the morning and the sun isn't here yet but it's coming. At 'six' we can see the light; at 'seven' we all line up. At 'eight' we go to work. At 'nine' we work, at 'ten', 'eleven', 'twelve' ... then it's belo [the-station bell for the lunch hour]. At 'one' we work again, and so it goes. The wristwatch itself truly marks the sun in this way. The whiteman really knows about time. But before, we didn't know at all. Now we know, but the whiteman still hasn't told us where the sun goes at night. Ellis biano ocuar-

So, apart from the passage of genealogical time, and their general notions of days, lunar months (un-named and un-counted), and the yearly

48

repetition of pandanus nut harvests, Duna have little consciousness of time. From this, some might argue that it is impossible for the Duna to exploit one another on the basis of hours of labour, since prior to contact with whites they had no consciousness of hours of labour as a factor in production.

On the other hand, Duna have definite (although qualified rather than quantified) notions about the intensity of labour. Preparing a garden-site in forest is "more hard work" than a garden in re-growth fallow. Felling trees with a stone axe is "really hard work", while mounding sweet potato is "a little-bit hard work". So energy rather than time is the appropriate basic concept in their consciousness of labour as a factor in production. In their consciousness, exploitation (if it exists) is a matter of the false appropriation of energy, not of time. So that of the two methods of estimating the relative shares of men and women in production as a whole, I have little doubt that the estimation in terms of energy expenditure (which suggests an equality in the division of labour) comes closer to the experiential consciousness of production among the Duna (both men and women) than does the alternative estimate (which suggests exploitation) in terms of time.

But there is a puzzle, if not a paradox, in this substitution of energy for time in the calculus of exploitation. To rest the demonstration of the appropriation of surplus-labour, one of the most fundamental of Marx's achievements in the study of capitalism, upon an optional basis of either time or energy, depending upon the consciousness of the producers, seems to introduce a large subjectivity into the theoretical object of marxian thought. Whereas the object of marxian theory is generally supposed to be free of false dichotomies of subjectivity and objectivity, and therefore truly capable of distinguishing a false consciousness among producers from a correct consciousness, a theory tailored to the conditions of Duna consciousness suggests that there is, objectively, no exploitation because, subjectively, women can never be falsly appropriated of the time that they do not think about.

1.94

The relation of the state of the

- I have be thank the sharehold the

But in saying this, do we not come closer to an understanding of what "correct" consciousness is? For the argument that women are not exploited because they do not miss the time they never realized they had is not unlike the capitalist's argument that the worker receives fair recompense for his labour in wages-the worker under the conditions of his own and the capitalist's false consciousness does not miss the surplus-labour and value appropriated from him. Indeed, he does not conceive of it, because it has no reality for him in his consciousness. But time, like surplus-labour and surplus-value, has a reality independent of whether anyone conceives of it or not. To put it into simple, concrete terms, the reality of time consists in what can be done with it, its practical utility. For Duna men, their shorter hours of labour mean more hours of leisure, hours in which men can travel, in which they can meet and enter into relationships with other men, and in which they can talk, listen, and communicate the knowledge (kono) which in their own view differentiates them from women and beasts and gives them the power and right to dominate both.

243.

I would argue then that there is an exploitation of women by men within the production process as carried out by the Duna. This exploitation is all but invisible, both to the ethnographer and (I believe) to Duna themselves, since both men and women contribute equal efforts in production, and both are equal joint owners of the product. Nevertheless, women by their longer hours of labour are deprived of the time which men gain by their shorter hours. Not that energy expenditure is not a real factor in production, and in this respect the Duna system is evidently one of equality. But only time makes possible the reproduction of the network of social relations and the structure of knowledge by which the men of each locality reproduce their dominance over women from generation to generation, and by which they reproduce a social formation of predominantly male-male relationships linking lineage to lineage, the men of each place with men of other places, both within Duna country and beyond. Because women have less free time than men, because more of their time is consum_ed by productive labour (in which they labour individually and for the most part in silence in separate parts of their gardens, isolated from one another as well as from men),

/15/

women are unable to compete in a male-dominated social world. They are unable to acquire the knowledge which both they and the men see as the ultimate basis of the social formation.

244.

Although much of this knowledge consists of magico-religious mystifications, it does not introduce another subjectivity into the theoretical object to say that the replication of the social formation in this instance rests upon knowledge. For the knowledge which men acquire through the agency of their surplus-time is in the first instance a knowledge of actual social relations and of the historical circumstances which have produced them and make possible an understanding of their operation in the present. In their spare time men are continually creating and re-creating both social relationships and knowledge of these relationships such that they are able to dominate the circulation of the surplus product (pigs) through the social formation, and this in spite of the jural equality of ownership of men and women in the product. That is, although women own the pigs as much as do men, men are continually in a position to dominate supposedly joint decisions about their allocation to the external departments of consumption and reproduction of the means of production. Men are able to say to women (as I have often observed): "Shut up! You don't know anything about this and we do. We men will think and decide what to do". Duna women mostly respond with an air of sullen frustration, a hurt silence by which they convey (and I am now speaking of and in subjectivities) their feeling that men do not appreciate their true worth. And even when they are able to find their tongues and say what they feel, they usually end by making fools of themselves, losing the thread of their rhetoric in uncontrollable fits of rage and tears. Men laugh and point out to the anthropologist how it just goes to show that women can't think and can't talk.

There is more. Those women who in spite of the full force of the common culture do manage to acquire some ability in public speaking and in influencing decisions (almost always the old widows with up-and-coming sons), are still confronted with a male-biased set of possibilities for circulating the surplus product within the network of social exchange. Even if women could suddenly acquire full equality with men in the making

Constant and the second of the second in the second s

ty that preval the pattern deviate the statuto

/15/

of decisions concerning the distribution of the surplus, they would still be confronted by the historical reality that the social formation has been constructed and reproduced over the generations by the circulation of surplus product between men and other men, on the basis of male decisions and male interests. Who one decides to "help", and with whom one cements alliances through the payment of damba are not matters of an equivalient set of cognatic and bi-lateral choices. Rather, they are always conditioned by the pre-existing social relationships which are handed to people by their own past history. A woman cannot influence a decision that a particular pig be sent to reinforce structures of relationships within her matri-line or among her matrilateral kin in the way that a man can argue for the renewal of his relationship with his patrilineal or patri-lateral kin, for the simple reason that the relationships composing female-biased lines within the Duna social formation have been irretrievably broken and lost. Women can occasionally send pigs to reinforce immediate relationship with their mother's people, but beyond that the relational structure is shattered. Most women do not even know for certain their mother's mother's name or place. As the men say in relating link after link in their maledominated genealogies: "Nobody remembers women ... They're not important".

245.

The most decisive factor in this severing of links between women and their sisters, mothers and grandmothers (who, in terms of relations of production share a common class-like position and are therefore potential and necessary allies in the "struggle" for dominance with men) is, of course, the institution of virilocal, exogamous marriage operated through the mechanism of bride-price. The final irony is that by rearing pigs for their brothers' and son's bride-prices, women are not only contributing to the future reproduction of their own lineages (as defined by the prevailing patri-dominated cognatic ideology of descent), but in the same measure contributing to the development of the very structures which prevent them from organizing themselves and becoming conscious of their interests as women.

Such, in outline, are the consequences of the primary exploitation of women by men within the production process. This exploitation has as its conditions those structural features distinguished by Dupré and Rey: /15/

one particular group, the men, control the circulation of the surplus product (the pigs) in such a way that relations of dependency between women and men are reproduced. The particular features of this exploitation, features distinguishing the mode of production among the Duna from the capitalist mode and from other exploitative modes, are these: that the circulation of the surplus is controlled not by ownership (since ownership is on a joint domestic basis) but by the monopolization of surplus labour-time gained as a consequence of the relations of production. The surplus-time which men achieve through the intensification of production has the use-value which permits men to achieve a "secondary appropriation" of the surplus-product outside of the production process. As a result of production itself, men cannot claim more than half of the joint product; but at the completion of production, when decisions are made allocating the distribution of the product into the various departments of the economy, men are able to dominate decision-making and direct the greater number of pigs into their desired channels rather than into channels of consumption and exchange desired by women. They are able to do this because they have made use of their appropriated surplus-time (or, what is the same thing, the woman's deficit time) to elaborate politico-juridical and ideological structures which stand as the necessary co-conditions for the operation of the economic base. That is to say, that the relations of production not only are responsible for the surplus-time and the surplus-product through which the superstructural forms are created and ceaselessly replicated, but that the superstructural forms are simultaneously necessary to provide the conditions (both of social order and economic rationale) necessary for the continued existence of the base.

246.

Part Four:

An entranced the many and another of the state we have been be

The provide strategies the constitution and the construction

it of page horrigitume in the series and

the state and extremes the the appendit of the re-

Fride activity thereind games, the object to state and from a state of the state of the

PRODUCTION AND THE SOCIAL FORMATION

OTOERES CONT AND AND A

wind wind the resulting been

the Linuage, Genericky cancel and Channel

... here there is no presumption of adequacy; rather are conflict and maladjustment regarded as moving impulses in human history. And the subsistence needs are understood to operate, not in vacuo, but always already in a particular type of society and through its organization. Thus material production and the control of resources are marked off as of basic relevance in the make-up of societies; they are the fons et origo of all cultural developments—the "basis" acting upon and determining a "super-structure" which embraces all other mades of thought and action.

seture in a content, the second of states in all distributes

- S.F. Nadel (1951:379)

The mode of production of material life determines the general character of the social, political, and spiritual processes of life. It is not the consciousness of men that determines their being, but, on the contrary, their social being determines their consciousness.

at top of a stratement of the move of the stratement of the statement of the statement of the statement of the

The Area and the set the set of the state of the set of the

- Marx, Preface of 1859.

na a good kan saalaa Maraa

REAL TO LAD.

۰.

CR FI

1.16

1

100

/16/ The Lineage, Coercive Force, and Compensation

I have examined the production process among the Duna and proposed that there exists (as a concept, the workings of which are illustrated in reality) a mode of production characterized by relations of exploitation between men and women as bio-social categories. In the Duna example (and no doubt in many others) this exploitation is concealed, such that men profess (and women often believe) that the efforts of the sexes are equal and the resulting product is equally owned and equally divided. Within the limits of the data available and of my logical capacites, I have pursued an examination of this claim of equality and found it wanting. The exploitation is real, its concealment effected by the fact that what men appropriate from women is not an extra quantum of energy-expenditure over what men themselves contribute to production, nor an extra share in the ownership of the product itself, but only an appropriation of time. Women can at best be barely aware of this appropriation, since consciousness of time is as yet but scarcely elaborated, and since the time-advantage that men find in production seems a natural consequence of differing modes of work-performance (brief periods of intense work-effort vs. long periods of evenly-paced effort) provided for by the differing bodily forms of the sexes themselves. But, as has been seen, any initial advantage that men may have over women in this respect is compounded in the course of development of horticultural practices which tend to keep garden areas under longer and longer periods of continuous cultivation. Where a new garden site must be cleared for each new crop, as in Kapauku or Hewa or Maring extensive shifting cultivation, the opportunities for time-appropriation by men are Where systems of continuous cultivation operate, as in the minimal. Enga mondo technique, the opportunities are increased. The particular interest of Duna horticulture in this respect is that it provides an illustration of a system mid-way between shifting cultivation and continuous cultivation, and therefore also mid-way between the possibilities of the two extremes for the appropriation of labour-time.

I have reasoned further (by way of an informal, descriptive theory of the relation between production and the remainder of the Duna social formation, section /15/) that a direct series of connexions can be made between the surplus-time gained by men within the production process and their ability to dominate relationships and exchanges in the wider society, to the extent of almost completely controlling the distribution of pigs despite women's half-interests. I term this control arising from surplus-time a secondary exploitation. (Its real existence is perfectly obvious to the ethnographer in its daily manifestations: domestic quarrels, women's refusals to work as men want them to, men's refusals to distribute pigs as women want them to. What is not obvious is what I have brought to light here, the material conditions and relations of production which underlie the daily domestic struggle). The middle-terms between surplus-time and secondary exploitation are the terms of communication, of knowledge, of belief; the terms of the malebiased structure of social relations and the conditions of its creation, perpetuation and extension through the practices of marriage, lineage, relations and rituals. Time gives men the advantage to communicate among themselves and build for themselves the one single edifice of social relations within which circulation and distribution of the product must take place.

249.

To complete the examination of production among the Duna, it remains to consider this larger edifice, the structure of relations which has developed and reproduced itself continually under the regime of male surplus-time appropriation, and within which the surplus-production of each of the many domestic units of Duna country finds its final In considering this structure the examination returns to destination. the problem first posed in section /11/, the problem of consciousness in relation to production. For Duna produce pigs for the purpose of distributing them throughout that larger society which lies beyond the bounds of each homestead's individual domestic mode of production, while the larger society in the last analysis only exists as an effect of That is, the larger society provides the production and distribution. conscious rationale for all pig production beyond domestic consumption, but the rationality of the larger society itself rests upon the

production possibilities of the surplus. And since these possibilities rest upon exploitation and the concealment of exploitation, so also the rationality of the wider social formation is similarly affected. It too is characterized by false appearances. Its rationality must necessarily appear objectively as an irrationality, and subjectively to the Duna themselves—as a mystification (cf. Godelier 1966).

Before turning to the Duna example, a few comments on the marxian notion of the societal "superstructure" are in order. As Althusser (1969) has noted, the point of Marx's "topographic metaphor" is the notion that law, politics and the various forms of ideology current in any social formation are "determined in the last instance" by the economic base, the relations of production. As Nadel has argued (and I deliberately quote him out of context in introducing this part of the thesis), this notion of the basic relevance of material production to the entirety of society offers the anthropologist a more convincing functionalism than that of Malinowski (in which each culture or society is presumed invariably to possess an adequate set of solutions to a universally common set of functional problems). But Marx's notion of the superstructure is nevertheless a form of functionalism. It proposes that the function of the economic base is, indeed, to support the superstructure. And what is more, as Althusser emphasises, the reciprocal function of the superstructure is to reproduce the existing relations of production, i.e. to assure the continued existence of the economic base. Suddenly, the marxian theory seems to take on the same noninformative circularity of mutual functional-interdependencies that characterized and finally vitiated Malinowski's theory. Perhaps Nadel glimpsed this, since he went on to reject the possibility that marxian theory could really contribute to anthropology, on the grounds that:

The truth of the materialist conception of history cannot readily be translated into the specific grading of [functional] relevance characterizing this or that society; for in any given society the network of determinants is much more complicated and the scale of urgency more varied; and in this or that society it is simply not true that the 'productive forces' are the only 'real' or 'final' causes, or that—more crudely expressed—'men must first of all eat, drink, dress, and find shelter before they can embrace politics, science, art, religion, and anything else ...' (Nadel 1951:379). 0

There is, of course, a misunderstanding: it is not the productive forces but rather the relations of production that are the real, final causes in marxian theory. But more to the point here, to fix upon the functional circularities of the marxian theory of the superstructure is to lose sight of the crucial difference between such theory and the theory of Malinowski. To put it crudely, the Malinowskian theory understood "primitive" societies as if they existed only in the timeless moment of the ethnographic present, and within that moment it appeared that the various parts of the society were so inter-related in their functioning that interference with any single institution would radically disrupt the whole, bringing the illusion of timeless existence to an The marxian theory credits social formations with more durability end. -only an interference with those institutions that reproduce the relations of production can effect any real change-but at the same time marxian theory places societies firmly in real time, such that the point of the functional inter-dependence of superstructure and base is that the superstructure often indeed fails to carry-off its assigned functions. As Friedman has put it, "History is built on the failure of social forms as much as on their success" (1974:466). Failure is a consequence of functionally inadequate articulations of the relations of production with the forces of production, but it is within the institutions of the superstructure that people become conscious of these real conditions of their existence, and in terms of these institutions that the struggle to conserve or transform real conditions is carried out. Malinowskian analysis shows us in the examination of each institution why a particular society is the way it is. Marxian analysis shows us at each point the possibilities for more or less radical change. (I leave it to the reader to decide whether or not production must indeed take place before the Duna can regulate affairs between lineages, engage in rituals or, indeed, assure or extend the conditions for the exploitation of women. I suggest, however, that for production within the terms understood here, it is entirely necessary to continue for Duna to "embrace" the superstructural forms which give their economy subjective meaning).

A marxian theory of the lineage appropriate to Duna society can begin with the proposition that just as the individual homesteads of the society can be understood as production units analogous to capitalists' factories or firms (at least to the extent that the relations of production within these homesteads are antagonistic relations, founded on a mutual incompatability of sex-based interests), so the lineage may be understood by analogy to the State. The State in classbased societies appears as a formation of super-structural relations necessary to ensure by coercive force (in the last instance) the continuance of the relations of production, while in anything short of the last instance the State appears as the political arena of contending class-interests, the necessary space for the accommodation of the prevailing mode of production to the prevailing class-struggle (cf. Althusser 1969; Hindess and Hirst 1975: ch. 1). While previous scholars from Engels to Terray and Hindess and Hirst have seen in the lineage a community of common interests, and hence a structure almost the opposite of the State, by recognizing the existence of antagonistic relations of production between bio-social categories in pre-class formations it becomes possible to think the superstructural function of the lineage as directly analagous to that of the State.

252.

(Notice that I am here suggesting a general theory of antagonistic pre-class formations by analogy with the marxian theory of class-based formations in general, and not the theory of capitalist formations in particular. Further, it seems a moot question whether there are any pre-class human societies not based on antagonistic bio-social relations of production and reproduction. Hunter/gatherer paleolithic societies tend to be characterized by separate and autonomous men's and women's economies (hunting and gathering, respectively), linked by exchanges of products: meat is exchanged for vegetables and children (product of female reproduction) who become wives and initiated men, depending on sex. In the simple fact of exchange of an inanimate object (meat) for living human subjects it is possible to recognize a primary "alienation" indicative of the existence of antagonistic relationships. To pursue the matter further back, the separate men's and women's economies of + paleolithic populations become pre-human economies of self-subsistent

10 E

individuals who forage together in a band but do not exchange. To move forward from paleolithic to neolithic economy is, evidently, for men to fully dominate and appropriate the separate economy of women by incorporating it as the direct-production sector of the male economy, which then becomes the societal economy.)¹

Such a theory seems entirely appropriate to the example of the Duna damene. Each lineage in Duna country authorized itself (by its origin myth and its genealogy of members) as representative of the interests of all of its members, both men and women, residentially present or absent. This is of course illusory, since the women of the lineage are either married-out and hence separated from their means of production, or they are subjected to the home interests of pig production in their roles as mothers, sisters and wives (Duna say that their wives belong to their damene, though by marriage and not by "blood"). The authority of the damene is therefore the authority of its "ruling class", that is to say, of the men. Only men meet at the lineage noma (clearing) to hear the news and discuss events. Women may share their afternoon, meal together, but they should soon return to their gardens and not talk and gossip out of the hearing of men. Only men make plans to expand production together, to ready the lineage for war, to arrange contributions (piatsaiya) from individual members to finance a damba payment to allies, or to liquidate the standing pig population in a ritual slaughter in times of production crisis.

Whatever the decision of the men, women are expected to hear and obey. Women are considered incapable of meeting together and making plans of their own. Women who do meet together, or who appear to men to have some mutual understanding among themselves to which men are not party, may be suspected of witchcraft. Duna men have described to me how women who are witches meet together to plan in concert murderous attacks on the souls of their own kin and neighbours, and to eat the spiritual bodies of their victims. Men describe witches' meetings as often ending in confused disagreement, since women are unable to agree among themselves or to share out the bodies of their victims equally as men do with pigs.

The Duna lineage claims to speak for the common interests of all, but in fact represents only the arrived-at knowledge, views and interests of its men. The men of the lineage are of course further differentiated according to their status, whether they are residents or only visiting members, whether they are agnates or non-agnatic cognates, whether they are known as anoa kono (wise men), anoa kango (wealthy men), anoa deu ("hard men", men who influence by the sheer force of their personal violence) or nane yao ("nothing boys", young men who have yet to prove themselves of any account in lineage affairs). It is with the relations and jostlings for influence among these categories of men that anthropology usually concerns itself when it considers "politics" within the lineage. But from the point of view of a marxian theory, they are all equally men, all representatives of a single block of interests in relation to the means of production. Moreover, it is an indication of the extent to which Duna society has departed from paleolithic relations of production that boys do not need to be initiated "into" men. Boys and young men are held in strict subserviance to their elders until the elders decide that they are old enough to act as men (to wear a hongo head-band, to smoke tobacco, to attend singing parties where women are courted), but apart from the donning of the head-band, an informal event, there is no form of initiation. There is no need to separate boys from their mothers or "make them into men" for the reason (I suggest) that they have never belonged to their mothers-nor indeed have their mothers belonged to themselves, but only to their husbands and brothers.2

The State in marxian theory appears in the last instance as an apparatus of coercive force, directed by the ruling class against the interests of the direct producers. Coercive force is organized in respect of the internal maintenance of the relations of production and ownership (usually under the form of a police force) and also in respect of external relations with other States (under the form of an army). The external aspect of the State coercive apparatus serves a double role, defending itself against encroachment by other States and expanding its own material base by encroachment in turn, while at the same time serving as an instrument for the repression of the working class (by conscripting workers into soldiers, breaking workers' strikes or simply liquidating excess workers in battles).

The exercise of coercive force can likewise be examined in its internal and external aspects among the Duna. Within the lineage coercive force is (ideally) limited to slapping, beating (either with hand or stick), whipping and bashing with an axe (usually not fatal with stone blades). To draw a bow and arrow against a person is to declare an intent to kill and therefore a state of war (wei). The use of bow and arrow as instruments of coercive force therefore tends to be coterminous with the external aspect of the exercise of force by the lineage. Within the lineage, men agree among themselves that they have the right to slap, beat and whip their children, their mothers and sisters, and their wives. Women are granted the right to slap, beat and whip their children, so long as there are no objections from fathers and brothers. Women may of course also attack other women and even men, but men consider that they have no right to do so. Women should always bring their disputes to men for settlement. So far as the exercise of force by men against women and children is concerned, men of course recognize that a man may be within his rights without necessarily having good reason. A man who beats his wife or sister to extract obedience (almost always a matter of the woman's negligence or refusal to garden and tend pigs) is a "good man" (anoa beli), while a man who beats a woman who has not been disobedient or who causes a woman to suicide as a consequence of a beating is liable to be considered "thoughtless" or "not good".

Young boys are beaten for disobedience, although they are also often beaten on general principle, as it were, on the assumption that they have probably been up to some mischief and should be taught to respect authority in any case. Beating, it is said "hardens" a boy, and boys who are often beaten are thought to become *anoa deu*, "hard man" who will command the respect of others and never yield in matters of their own and their lineage's interests.

The use of a stone axe as a weapon is largely restricted to conflicts between men who recognize their common kinship and therefore do not intend to kill, but are otherwise prepared to go to the limits of coercive force to secure their interests. My interpreter Irari, for example, told me how when his father had died some of his kin had come to claim the body for burial near their homesteads. Irari intended that his father should be buried at his own homestead, and he threatened the men, his own damene "fathers", with his axe. The men then retired, accepting their deceased "brother's" wig from Irari as a token compensation. Axe-bashing, or the threat of bashing, is also used to sanction illegitimate sexual activity by young men. A man who "steal-copulates" and has not the pigs to pay bride-price is liable to be bashed by his own kinsmen for endangering the peace and placing them in the position of having to pay his bride-price for him. As well, a man who is discovered or suspected to be involved with a woman of another damene within the parish is liable to be bashed by his own or the woman's kin, on account of the violation of the rules of exogamy.

In the course of my fieldwork I heard of a number of cases in which men had killed their wives or sisters with an axe. In one case a man hacked off his sister's breast, in another case a young man hit his classificatory sister over the head and then cut off her breasts, in another case a man axed his wife in the genital region, while in yet another case a man told his wife to lie down for intercourse and then struck her over the head. All of these cases were related to me by men in a matter-of-fact way-they were regrettable incidents but there was nothing out of the ordinary in their obvious sexual sadism. The initial cause of the attacks were variously said to be persistent refusal to work, adultery, and improper sexual advances on the part of the women. Women who engage in illicit sexual activities are also sometimes punished by their brothers and/or husbands by being burned or whipped about the genitals. I think that the sexual nature of these attacks on women supports the general interpretation of the role of coercive force within the lineage as an instrument in the repression of women, conceived of as a class-like group on the basis of their sex. That the class-like antagonisms of the sexes are conceived of as a sexual rather than a

256.

257.

simply economic battle is also suggested by men's accounts of attacks by witches. Witches attack men in their sleep and the sleeper sees the witch attacking him in his dreams. The usual form of attack is for the witch to straddle the man (a sexual reference) and hack at his body with an axé. Men's belief that women attack them in this manner may be understood as a simple projection of their own sexualized anger against women.

The legitimate right of men to exercise coercive force within the lineage, particularly against wives and kinswomen, can be seen as a matter of the enforcement of exploitative relations of production in the last instance. Women tell their daughters "Don't ever think you're stronger than a man", and they can show them their scars to make the point-ultimately women must submit to male domination or suffer the consequences. Female suicide can be seen as another expression of this same situation, the hopelessness of opposing men. I recorded nine female suicides (and no male suicides) among the small population at Horailenda in the past twenty-five years. Almost every case was said to have been preceded by an argument with a man, either over the performance of worktasks or over the allocation of rights in pigs. Two cases were the consequences of men accusing the women of being witches. The other cases seemed to arise from trivial disputes. For example, Irari had disciplined his female cross-cousin with a mild beating for neglecting her gardening." She hung herself immediately after. Kemeru of Horaile told me that he had taken a neighbouring woman's pig from her to compensate himself for the pig's damage to his garden. The woman hung herself because of this. Men generally express righteous indignation that women should kill themselves with so little reason. Compensation must be paid in most cases, and a worker is lost from the lineage workforce. Cases of attempted suicide are nowadays taken to the court. Men express the opinion that the government should punish suicide attempts with jail sentences, to set an example so that other women will not suicide in future. "Women who hang themselves are just ruining the good work of the lineage", say men-thereby expressing their class-like interest in the matter.

may -

While the exercise of force within the lineage can be seen as the enforcement of the relations of production, it is also important to recognize that in a sense this exercise of force is only possible as an effect of legal relations that depend upon the production of pigs as surplus-values. While men have the right to beat women, they do not have the right to injure them such that the interests of other men are interfered with. If a man injures or kills his wife, her lineage kin will demand that he kill pigs for them as kaka (compensation for injury) or that he surrender live pigs as damba (compensation for death). Likewise, if a man injures his own sister, her husband and even his own kin may demand compensation of him. Some years before my residence at Horaile an incident occurred in which my neighbour Kualu and his wife were fighting. The wife began tearing the thatch off her husband's roof and Yopa, Kualu's "brother", came to his aid and bashed the woman. Subsequently she suffered from the injury to her back and her son began to demand that Yopa (his classificatory "father") pay compensation. Yopa finally agreed to pay a pig, but only after the son paid Yopa a pig due as an outstanding fee for stud services. In principle the pig should be paid to the woman herself, but in practice the pig is usually killed and eaten by her homestead group. The point to be appreciated, however, is that the existence of pigs which can be made-over to others in compensation payments makes it possible for men to exercise coercive force within the lineage without risking the rupture of internal relations through damage to the interests of other men. If a man injures one of his own female workers, it is his affair, but to the extent that his workforce is also at other times a part of the workforce of other men of the lineage, or of his brother-in-law's workforce, he is liable to risk his relations of solidarity with them. If there were no pig production as surplus wealth available for exchange, then there could be no damba and kaka, and without these legal forms the scope for the exercise of force against women within the lineage would be greatly curtailed. The risks for disruption of solidary relations among men would be too great without the possibility of compensation. As it is, by producing pigs for their husbands and kin, women as a group are producing the means of their own subjugation, the means whereby compensation is substituted for injury and death, thereby making the internal exercise of coercive force a realistic alternative to a war of all against all.

Warfare

Interpretation of the lineage as an apparatus of coercive force for the maintenance of relations of production can be extended into the realm of external relations between lineages. In most anthropological accounts, external relations of coercive force are subsumed under the rubric "tribal warfare". The rationality of tribal war, like the rationality of all war, often appears dominated by the possibilities for destruction and final termination of social relations that can be realised within the scope of what people are willing and able to do when motivated by hostility and aggressive intent. Duna are (or, rather, were) able to kill one another, either one by one in staged battles, or severally at once in ambushes and raids on houses. They kill pigs, sexually assault and kill women, burn houses, tear down fences, uproot bananas and pandanus, ruin sweet potato mounds, and in their own words, "wreck everything". These activities have been understood variously as an integrative activity for the group (Malinowski 1941), an unavoidable concomitant of population pressures and competition for scarce resources (Harris 1971, ch.10), or even as a simple failing of human nature insufficiently controlled by culture (Hallpike 1973). Marxian theory offers another perspective: tribal warfare between lineages, like the wars of nation-states, can be conceived of as an effect of a politicojuridical apparatus guided by class-like interests of economic exploitation, that is, by the interests of men pursuring the economic objective of appropriating surplus labour from women.

The last Duna wars were in the period of pacification, 1954-1961: "the Government would come and we'd stop fighting; then the Government would go away and we'd fight again. Finally the Government came and stayed, so we never finished some of our fights." My factual knowledge of Duna warfare derives from questioning of informants, and particularly from a collection of war-histories as related in their own terms by Horailenda men. Two such histories, in outline, must serve here to convey an impression of the practice of warfare among the Duna:

Case 1. Kalambo of Huguni vs. Warago of Hagini, as related by Yopa of Horaile:

Warago's brother was Maradowa. One time, Kalambo's sister's son, Witsini, got sick. He was dying and he told Kalambo that Warago had made *ndegao* (a form of sorcery) against him. I didn't hear what the reason (*tse*) for their enmity was. After Witsini died, Kalambo, who was also a sorcerer, thought about it and then killed Maradowa with *ndegao*.

Warago saw his brother die. Right away he suspected Kalambo, knowing that his brother had been killed in revenge for Witsini's death. He sent word to Kalambo: "You killed my brother with sorcery!" Kalambo sent back his talk: "No, I didn't." Warago replied: "All right, you didn't kill my brother; you can kill pigs and bring them here" (*sic*). Kalambo replied: "all right, I'll kill pigs." He killed three pigs and sent the half-sides by intermediaries who were unrelated to both men. The half-sides arrived, but when they went to cook them a man named Karali of Yalai' saw blood welling-up on the flesh. He was a man with *kono* who knew about such things: "Mother! Kalambo has sent these pigs, but a fight is going to start anyway. He won't just sit and do nothing."

After this, Warago said: "all right, we'll eat first, but after that we'll go and fight." They ate the pigs and then made a surprise attack in the night on a house at Huguni. Two men of Kalambo's *damene* were wounded, but they got away.

Then the fight really started. Everyone fought at Hulumbu, a place inside Huguni parish. We Horaile' men all fought on Warago's side. Some Huguni men also joined Warago against Kalamboperhaps they were angry with Kalambo about something, I didn't hear.

Everyone fought for one day and there were many injuries on both sides, but no one died. The next day the Hagini men and we Horaile men went to fight again, but the Huguni men didn't come so we left and came back.

Both sides readied themselves. *Wei Kaka* pigs were given by each fight leader for the men injured on their side, and war gardens were cleared and planted. Some months later the Hagini men started the fight again without asking Horaile to come and help. The Huguni men said: "if Horaile had come it would have been bad, as they truly know how to fight. But we can easily beat the Hagini men." They fought for one day and Hagini was really beaten: some men were dragged away with five or six arrows in them—but again, nobody died. Horaile' men went to help Hagini the next day, but as before, Huguni didn't come to fight, so we left off. Hagini men who lived at Horaile' and Horaile' men who lived at Hagini then said among themselves: "let's forget about this fight. We've fought twice now and no one has been killed. If an man had died we would fight again, but no one has died, so let's quit." The next day no one went to fight.

No settlement was ever reached. Kalambo and Warago remained as the *puya* and the *anumanda* (two snakes reputed to always give each other wide berth). Warago was the *wei tse* ("war originator") of three fights in all, and his father had been *wei tse* twice before that. Warago was a wealthy man and truly a man with a big name.

Case 2. Yuni and Dolo of Horaile' vs. Pendepa of Nauanda, as related by Yopa of Horaile:

Pendepa and his daughter were living at Nauanda, near the Dano Creek boundary with Horailenda. Dolo and his brother Yuni lived nearby on the Horaile' side of the creek. Dolo would go walking in the forest along the creek and this girl (Pendepa's daughter) would make a signal by stomping on a hollow log, and Dolo would go and copulate with her. They didn't say anything to anybody, but some Naua' people saw them.

Nauanda men crossed the Dano and came up to Yuni and Dolo's house. Yuni was in the garden with some other men. The Naua' men demanded bride-price for the woman. Yuni said: "My brother has been copulating for nothing, so I'll ready the bride-price." But then Ipaiya, one of the Naua men, drew his bow and shot at Yuni. "So! You've come to shoot men have you? All right we'll fight!" shouted Yuni. Everyone cried out for reinforcements and the Naua men withdrew under fire to the Dano. The fight continued along the banks of the creek.

Aluaipe of Horaile' got an arrow in the neck and the next day he died. Then Yuni said "If Dolo hadn't steal-copulated, this man wouldn't have died, but Dolo did, so Aluaipe is dead. It won't do if we go on fighting and Naua men kill another of us. Pendepa's daughter can come and stay here and I'll give the bride-price. Let's not fight." Meanwhile Dolo had run off and was hiding in a cave. He didn't have any pigs and he was afraid his brother might shoot him. The Naua men had retired after the first day and were waiting to see if Yuni would come and fight: "If Yuni comes, we'll fight again; if not, then we won't fight."

I think that what happened was that the Naua men had agreed in advance to shoot at Yuni so he'd be afraid and quick to pay the bride-price. But the Horaile' men weren't cowards and didn't care about being outnumbered. They fought furiously and shot lots of Naua men and drove them across the creek.

Later Yuni gave damba of nineteen pigs for Aluaipe's death, and they all danced the mali in celebration at the noma (clearing) where he was buried.

In all, I collected data on twenty fights in which Horailenda men had participated during a fifty year period. One of my oldest informants, Tsewagu, had been active in most of these fights and I feel reasonably confident that the list is complete. I also gathered partial information on twelve other fights involving Horaile' men between ca.1810 and 1910, as well as four other cases involving Horaile' men while they were resident in other parishes. I summarize this material in Tables 16:1a-d.

A

Table 16:1a Some characteristics of Duna wars --- all fights ca. 1910 - 1960 involving residents of Horailenda parish (N=20).

	[matsana weiya [N=6]	Yurugi-y weiya (M	<i>Janene</i> J=14)
Ostensible cause:			
revenge for deaths attributed to sorce	ry 5	6	
other causes	1	8	
Residences of wei tse (war originators):			
in same parish	0	6 *	а.
in different parishes	6	8	
Number of wars in which pre-fight preparatio were reported:	ns 4	.3	4
Allies from parishes other than those of the weitse:		76	
no allies joined fight on either side		2	3
allies "divide themselves" by kinship	1	7	
allies join on a regional basis	5	5	
Average number of days fighting:	4.2 days	2.7 da	ys
Average number of deaths (both sides):	2.8	1.4	
How terminated:	► (H) = m.	· · ·	
mutual agreement and joint withdrawal	5	9	
refusal of one side to join battle	1	3	14 14 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
mutual agreement following intercession by third parties	n 0	2	
Outcome :			
draw (equal number of deaths on both s	ides) 4	10	
victory/defeat (unequal deaths)	2	4	
Number of wars concluded by wei uwanda:	2	3	τ.

Frequency of wars: twenty in fifty years = 1 per 2.5 years Frequency of deaths of Horaile' residents: 7 in fifty years = 1 per 7 years

Ostensible cause:	Resident parishes	in different (N=14)	Resident in same parish (N=6)
revenge for deaths attributed to s	sorcery	9	2
other causes	-	5	
Descent groups of wei tse (war originate	ors):		~
common ancestors recognized		8	6
no common ancestor recognized	•	6	0
Number of wars in which pre-fight prepar were reported:	ations	5	2
Allies from parishes other than those of wei tse:	the	* *k	the state of the s
no allies joined fight on either s	ide	. 0	_ 2
allies "divide themselves" by kins	hip	4	4
allies join on a regional basis	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	10	0
Average number of days fighting:		3.4 days	2.8 days
Average number of deaths (both sides):		2.4 -	1.2
How terminated:			Б
mutual agreement and joint withdra	wal	10	4
refusal of one side to join battle		4	0 7
mutual agreement following interce by third party	ssion	o	2
Outcome :	Address of the second	P	
draw (equal number of deaths on bo	th sides) 9	5
victory/defeat (unequal deaths)	- MA	5	1
Number of wars concluded by wei uwanda:		2	3

N. N.

.

. •

\u. 1

/16/

263.

and all an

Table 16:1c Osten of we	sible i tse	causes ((N=36)	of Dur	na wars _	_ by k	inship	rela	tions	
				o.					
-	ites	-agnatic ites	ognates	m-agnati ites			ilable		stance*
	se agn	ngoo non-se	itant co	tant no cogne	ines	-kin	a unavo	al wars	rage di
	c10	010	dis	dis	aff	non	dat	tot	ave
Cause	-								÷
sorcery	Ò	0	. 1	4	0	5	0	10	5.4
theft	0	0	3	1	0	1	0	5	4.6
steal-copulation	0	1	1	2	0	0	2	6	4.0
unpaid indemnities	0	1	0	1 ~	0	· 0 - ·	0	2	3.5
bride-price payment	0	Ō	0		1	0	0	2	4.0
birde-price distribution	2	. 1	0-	1	0	0	0	4.	2.3
revenge for killing	0	0	1	1	0	0	0	2	4.5
trespass	0	0 [°]	0	0	0	1	0	1 77	6.0
data unavailable	0	0	0	O t	0	3	1	4	_
totals	2	3	6	11	1	10	3	36	-
							45.35	£	

*average "kinship distance" calculated on the following assumed values: close agnates = 1, close non-agnatic cognates = 2, affines = 3, distant agnates = 4, distant non-agnatic cognates = 5, non-kin = 6.

/16/

264.

	same or d loca	adjacent lity	same parish	diffe paris	rent hes	totals	average distance*
Cause				٠.,			
(ger i sur		in all in the
sorcery	1		1	8		10	4.5 km
theft	2		2	1		5	2.7 km
steal-copulation	2		3	1		6	1.0 km
unpaid indemnities	0		0	2		2	
pride-price payment	0		1	1		2	<u>ılı</u>
bride-price	A.	4*	1.	1.		2	
distribution	. 1		1.	2	· ·	4	2.9 km
revenge for killing	. 1		1	0		2	-
trespass	0		0	1		- 1	
data unavailable	'i O		0	4		4	- 25
totals	7	-	9	20	~	36	

Table 16:1d Ostensible causes of Duna wars — by residence of wei tse (N=36)

*average distance between homesteads of war initiators in kilometers.

The organisation and conduct of Duna wars is similar to that described by Glasse (1959; 1968, ch.6) for the Huli, except that Duna conflicts are smaller in scale. Three factors seem immediately responsible for this difference: (1) the lower density of population in Duna country means fewer warriors in a given area; (2) the more rugged terrain of the country impedes movement and limits the distance from which allies will come to join in a fight; and (3) the lower productivity of gardens restricts the numbers of warriors who can be fed and the duration for which a fight can continue. As well, there would seem to be a normative factor. By comparison with the Huli, Duna seem more willing to leave off fighting and often say that a few days of battle, even if no one is killed, are sufficient to settle a grievance. Huli seem to feel that deaths are more necessary to right a wrong. But behind these differences there is a factor deriving directly from production:

X.

both Huli and Duna observe the convention that every death in battle must be paid for with live pigs as *damba*. Since the Duna seem to have had fewer pigs than the Huli, they could less afford large numbers of casualties. In fact, I was told that in several cases the explicit reason for stopping a fight was mounting concern that the lineage would not be able to meet its subsequent financial obligations.

Although Duna sometimes distinguish between large fights (wei pukua) and small fights (wei ketse), the distinction is merely descriptive and not of structural significance (cf. Glasse 1968:91). A contrast with structural relevance is that between imatsanane weiya and yurugiyanene weiya: the former refers to fights between men unrelated by descent from common ancestors (literally, "women-taking (groups) fighting"), while the latter refers to fights between related men. Yurugi are classificatory brothers, while yana refers to unrelated men; the compound phrase apparently means something like "classificatory brothers who have become as strangers". As the tabulations show, fights between unrelated men are more often of longer duration, involve more deaths, and are most often provoked by charges of sorcery and counter-sorcery. Men from other groups with no immediate concern in the dispute are more liable to join such fights, usually on a regional basis with men from adjacent parishes "helping one another yao (for no reason)". Whenever an ally kills an enemy or enemy ally, the killer's "hand" is "backed", i.e. a reward of 6 to 20 live pigs is paid by the wei tse and his lineage. Likewise, for each injury sustained by an ally, the wei tse must kill pigs as kaka, a sacrifice to be eaten by the warriors, particularly the injured. Each death of an ally must finally be reciprocated by damba, live pigs presented to the deceased's next of kin to be distributed to his damene in substitution for the lost life. Fights between unrelated wei tse were seldom resolved completely, and further vengeance in the future might be attempted through sorcery or renewed open conflict.

Men who recognize common ancestry should settle their differences if possible. Such fights are rarely a consequence of sorcery, more often a matter of women or pigs. Men say "we are really brothers and here we are just fighting over a woman_let's stop the fight." Allies in such fights more often join the two sides by "dividing themselves"; the men of each ally parish divide into two groups and fight on opposite sides.
Most men join the side to which they recognise their closest kinship relations, but some men have equal obligations to both sides and so join on an *ad hoc*basis. Sometimes the "men of *marita*" (the men who live in the lower reaches of each parish) join together against their parishmates who are "men of nut pandanus": sometimes the division is even more arbitrary. With men of each parish fighting on opposing sides as allies of the respective *wei tse*, the liklihood is increased that a man may kill one of his own kin or neighbours. Warriors disguise themselves with soot and leaves when they go to fight, so that they will not be recognized, but they observe as well a further financial regulation: when a man kills a kinsman acting as an ally on the other side he must pay live pigs to the next of kin "to save his face from shame". The *wei tse* is responsible for reimbursing his allies for such payments.

267.

Each wei tse is responsible for all deaths and injuries on his side. Duna do not pay damba (compensation) to men to whom they recognise no relation, nor do they seek to settle disputes through the payment of damba. Damba is rather, a compensation paid to allies, kinsmen and friends, who have supported the cause of the wei tse and lost their lives in so doing. At the end of a fight it is sometimes agreed that the two sides should restore amicable relations; men from both sides meet and exchange a few large pigs to be eaten in a collective feast. This is called wei uwanda, "putting the war to sleep". Other than wei uwanda and "shame" payments, there are no pigs exchanged between damene of opposing sides.

The residence of war initiators, whether they live in the same parish or in different parishes, seems also a determining factor in the outcome of fights. There is of course considerable overlap between residence and descent. Co-residents of a parish are almost always kinsmen. But many fights between different parishes are regarded by Duna as fights between *yurugi-yanene* (related men), although in their actual course (as revealed in the tabulation) they tend to be more like fights between unrelated men. Despite the apparent significance of residence, Duna focus on descent because in their eyes it is the men of the *damene*, however they may be residentially dispersed, who share ultimate financial responsibility for the consequences of war. Thus, for example, when a man of Haiyuwi' parish who happened to be residing "without reason" at Horailenda provoked a fight with men of Hagini, the fight was spoken of as a fight between Haiyuwi' and Hagini, even though it was over before any Haiyuwi residents had a chance to join the battle. In jural principle, all of the men of a *damene* (lineage) are equally responsible; it is only for convenience that particular men, lineage leaders or men who directly precipitate fights by their actions, are named as *wei*, tse.

It sometimes happens that a man involves his lineage-mates in a fight they are unwilling to support. But as Duna say, "men are quick to fight and only think later about *damba*". Even a small lineage with few resources can thus find itself embroiled in a major conflict through the readiness of allies to join battle. Influential men, men with *kono*, argue for a settlement and warn the initiator(s) not to be so rash in future.

While a war is under way, available pigs are needed for kaka, to be killed and eaten when there are wounded men to think of. When the conflict is finished, lineage leaders call together the men of the damene to eat vegetables and talk about blood compensation (damba). One man will reckon with the aid of small counting sticks the total number of pigs that will be paid, and each man of the group takes one or more of the sticks as his homestead's pledge. Sometimes it is possible to meet the required number of pigs out of available resources, but. more often men must commit themselves to readying the pigs some months later. "Men with talk" urge their damene-mates not to give pigs to others for any other purpose, and the women of the lineage are continually urged on with the reminder that "the deceased's kinswomen are crying; the damba must be paid soon!" Finally all is ready and the pigs are brought together at a noma, which is sometimes cleared and leveled especially for the occasion. Lineage spokesmen make speeches, depreciating the "small and few pigs" they have readied (sometimes further pigs are concealed nearly and dramatically produced at the last moment) . The pigs are divided: equal numbers for the matrilateral and patrilateral kin of the deceased. Then the male next of kin or other representatives of the deceased's damene conduct the distribution of pigs among the bereaved. Sometimes a distributor will say "I see my dead kinsman's face in these pigs, how can I let them go?" but in the end an anoa beli will give

(1

away every pig, "leaving nothing for himself except the dust on his hands". At the conclusion of the distribution, the host group which has paid the *damba* dances the *mali* to celebrate the discharge of obligations, with a day of dancing for each fifteen pigs given. The men "sing of the mountains, the trees of the forest and other big things", and young women with modestly downcast eyes join the circling line of dancers alongside their intended future husbands.

Although warfare appears at first glance as a more-or-less unlimited exercise of coercive force between lineages, an ungoverned conflict of autonomous units, there are in actuality a number of conventions or rules of war which are observed by all parties.³ These are the conventions of compensation, the customary schedule of prestations of pigs in exchange for an acceptance of injuries and deaths. The rules of war are the ideological practices of a system that links human lives (and violence in the conduct of lives) with economic production. The practice of compensation means that productive resources are circulated through social exchange as a substitute for lives themselves. Warfare then provides a rationality for production: Duna produce pigs so that kin will help them when they need help. Without pigs one is rubbish, without pigs no one will come to your aid when you are attacked. Or, rather, they will (because men are quick to fight), but afterwards your friends and distant kin will be "angry" with you and are liable to attack you in turn. Because the rules say that pigs are an acceptable substitute for human lives, pigs acquire a value in excess of their value as food to be eaten; pigs are not only comestibles, but symbolic substitutes for humans themselves ("I see my dead son's face in these pigs, ... "). " The rationality of production is therefore determined not only by the pig's use-value in eating, but also by its role in social exchange. (Note that although the Baktaman and Hewa conceive of the pig as a valuable to be exchanged, neither people practices compensation by substitution. For them, the killing of people can only be reciprocated by further killing, and warfare has little direct articulation with economic production.)

Warfare among the Duha urges on production by creating the need to produce beyond what is needed for consumption: men produce for safety and defence, and for reputation and power. Membership in a lineage links every man as a household head in a joint liability corporation, committing a portion of his homestead's production to the maintenance of relations of war and peace with other lineages. Women are then urged to produce more, either to help their fathers and brothers or their husbands and sons. When there is a war, "everyone must think about the *damba*", and so women must work harder to produce more pigs.

The rationality of the rules of war not only urges on production, but creates situations in which men are able to appropriate women's surplus product outside of the production process, as a secondary appropriation. When deaths occur in war, the wei tse calls upon his lineage kin to provide contributions to the damba. He calls upon his sisters too, and they urge their husbands to "help nothing" with half a pig, so that the woman can give her half to her brother. Likewise the men of the lineage reason with their wives: "I'll give our pigs and later on I'll help your kin yao (without any basis in descent)." But women "help" their husbands with half-shares towards damba far more often than husbands help their wives. And in any case, when women give over their interests in pigs for the financial support of their husbands' domene, the rationality of war and compensation suggests that they are but contributing to their own welfare and safety as resident members of the parish, by marriage if not by descent. By contrast, in most cases where men "help" their wives, the exchange is seen instead as a manifestation of reciprocal support between brothers-in-law. The wife/sister's contribution to the exchange is subsumed within an ideology of male-male political economic/kinship relations.

Because it is men who are mostly killed in war, and men's deaths which are mostly reciprocated by *damba*, a further effect of Duna practices of warfare and compensation is to transform awareness of pigs as owned "half-side - half-side" into an appearance of pigs as substitute equivalents for men's lives.⁵ Women own half-interests in most of the pigs contributed to a *damba* presentation, but in the act of handing over the pigs at the *noma* it appears as if male lineage-spokesmen are presenting

pigs on behalf of the men of the lineage, to the male representatives of the deceased, in respect of a male death. In the process of the social exchange pigs come to be seen as substitutes for men, acquired seemingly because men have died, paid for as it were by male blood rather than produced by at least 50% female labour. The origins of production are obscured through the identification effected by maledominated prestation. Not surprisingly, the distributor allocates very few of the *domba* pigs to women of the deceased's lineage. For the most part, men of the lineage receive pigs for the deaths of their "brothers" as if men possessed rights in them in full, as their pigs (certainly not half their wives', although perhaps half their sisters'), owned by them and controlled by them in future transactions—except to the extent that women may be able to claim interests as caretakers, .

Duna warfare and practices of compensation therefore urge women to intensify their production to meet the political needs of the lineage, while at the same time effecting secondary false-appropriation outside the production process through the exchange-substitution of pigs for male human lives. If warfare indeed serves these functions for the Duna, it then becomes understandable that many Duna wars have no apparent That is, Duna do not necessarily have wars to defend rational cause. themselves and their property, but rather, wars may be provoked as a goad to production and an aid to appropriation. While perhaps two out of three Duna wars are attributable to violation of property rights and rights in women, it is notable that the most serious wars (those that last the longest and bring about the most deaths) are believed to be due to sorcery. At the conclusion of section /11/ it was proposed that the rationality of production, so far as Duna are concerned, rests upon objectively irrational notions of magical ancestral power. Production does not (did not) appear possible to the Duna without foundations in magical knowledge and power. It now seems that a large part of the purpose for which production is carried out may also be dominated by objectively irrational factors: pigs are not produced to be eaten so much as to finance wars fought over apparently imaginary motives, wars based on the belief that men can kill one another by a look with the eye and the uttering of the gao (spells) of sorcery.

I made persistent efforts in the field to find some real basis in conflict of interests behind sorcery accusations. As Figure 16:2 shows, accusations of sorcery are made between unrelated men who live at some distance from each other. In each case I investigated, my informants either stated that they did not know why such men should wish to ensorcel one another, or that the reason for the sorcery was revenge for previous sorcery, the reason for which was not known. It was assumed that the enmities of sorcerers did have some foundation, perhaps in unpaid debts, but in most cases there was not even a history of prior association between the principles. When questioned further as to why they believed actual sorcery had been the cause of deaths claimed as ostensible causes for wars, my informants referred to insubstantial, symbolic "proofs" such as the blood on the pork presented by Kalambo to Warago. Indeed, Duna admit that many accusations of sorcery are false, and that men accuse one another in the hope of extracting damba under threat of war if compensation is not paid, ⁶ but whenever accusations led to war it was invariably claimed that the particular allegations had been trueas the evidence of the omens proved. It may be that all wars due to sorcery begin in reality as more-or-less' conscious deceptions, as fraudulent claims to obtain damba. But in many cases it seems that the parties to the dispute commence hostilities without even giving the other side a chance to avoid war. The conclusion suggested is that Duna wars, in at least some instances, are precipitated by men who wish war, not because of any direct cause of conflict, but because wars provide an opportunity for leaders to come to the fore and to organize their lineages for increased production by which they may pay kaka and damba and acquire "big names" as generous men who honour their obligations.

272.

6.7

If men sometimes provoke wars in order to enhance their reputations and provide a rationale for intensified production within their lineage, it becomes possible to offer a final theoretical suggestion: in those Highlands societies where the custom of compensation for deaths in wars is observed, the level of conflict may be viewed as an expression of the lineage's capacity to appropriate surplus. Warfare and production are intimately linked such that lineages have wars because a rationale is required to wtillize their productive capacities, while at the same time warfare itself is limited by the production possibilities of the group. The limitations of homestead/lineage production systems act as a brake on the escalation of conflict. Like capitalist states, lineages sue for peace when they can no longer afford (economically) to fight. The practice of warfare in these societies thus requires a certain level of production while providing at the same time an ideological rationale for production.



Figure 16:2 Distribution of Duna sorcery and witchcraft accusations, by kinship relations and residential separation of principals (all recorded cases).

These suggestions have some bearing on a comparative interpretation of killing rates in central New Guinea societies:

Table 16:3 Deaths by violence, as percentage of all deaths adults only

		Men	The second secon	Women	anna an
Baktaman	both :	sexes: 37	.5% (N=48)	<i>h</i> ,	
Hewa (south of Lagaip)		20%	(est. N=73)	30%	(est. N=69)
Duna (Horailenda)		8%	(N=204)	5%	(N=133)
Huli (central Tari area)	na je	20%	(N=409)	6%	(N=360)

Baktaman data from Barth 1975:272, based on genealogical evidence. Hawa estimates calculated on the basis of Steadman's (1971) data: 36 recorded killings over a 10 year period in an adult population of approximately 200 and assuming an average life expectancy of 30 years. Duna figures from genealogies. Huli data from Glasse 1968:98, based on genealogies. From the limited evidence available it appears that the killing rate may describe a U-shaped function in relation to population size, density or production intensity. As proposed in section /4/, if Duna society be seen as transitional between low-productivity societies such as the Baktaman and high-productivity societies such as the Huli or Enga, then it may be that in the initial stages of production intensification warfare is reduced through the jural linkage between compensation payments and pig production. The relatively high rate of deaths by violence among the Huli (who observe the same practices of compensation as the Duna) may be related to their population density, but this cannot account for the high rates among the Baktaman and Hewa. Since conflict is then not directly related to population density, it may be that the Huli fight and kill more because they produce more pigs and can therefore "afford" more violence.

274.

This account of warfare between lineages is offered solely from the perspective of a materialistic theory. But people living in tribal societies have no such perspective. However much they may be subject to illusions and false appearance, the Duna are confronted by the same intellectual and philosophical problems as everyone else. Sorcery is perhaps the best illustration. As I have shown, accusations of sorcery are frequently given as the explanation, the "cause", of particular wars. However irrational this may appear, belief in sorcery nevertheless provides an answer to some of the agonizing questions of existence, especially the problem of death. As well, it provides avenues to action for the bereaved. The rationality of warfare is based not only on its "invisible" articulation with the realm of productive activity, but also on the needs of people to express their feelings in the only ways open to them, the only ways they know. A full account of warfare (as of any other institution of Duna society) would therefore require the investigation of individual psychology. Such investigations cannot be pursued here. In deference to the primacy of Duna experience, however, I conclude this section with an excerpt from my field-notes. Yopa of Horaile'

Kotsape's mother kept the wig in her net bag and took it out all the time to look at. She didn't show it to anyone else, but she cried and cried. She never did any work she cried so much.

One time she was staying with her daughter and son-in-law at Kaguena. They were killing some pigs and the daugher told her mother to help by gathering some greens, but the mother went on crying. The daughter got angry: "What are you always crying for?"

Now, her mother really tells her: "You want to know why I'm crying? This is why!" She took her son's wig out of her bag and threw it on the ground. "I bore you, and I bore Kotsape. Kotsape didn't die of nothing; they killed him. If you're a man you can take revenge, but if you're a woman all you can do is cry. You're my daughter and now you have a child of your own. One day they'll kill him and then you'll cry just like me! You'll see!"

Then the son-in-law came up and asked "What's all this?" The daughter explained and the son-in-law said "I'm not your kin, I'm another man, but your mother has come to say with me and she cries all the time and that's not right. I feel sorry for her, so I'll take revenge. Put the wig away and leave it to me. Now we're eating pigs and you can't think about it anymore." That was good, and so they did as he said.

Later, the son-in-law arranged for the killing of the sorcerer. That's what happened, and that's why there is enmity between these *damene* today.

Sacrifice, Ideology and Transformation

"What is the meaning of it, Watson? What object is served by this circle of misery and violence and fear? It must tend to some end, or else our universe is ruled by chance, which is unthinkable".

- Sherlock Holmes in The Cardboard Box

The rationality of pig production is partly determined by the values involved in the creation and maintenance of social relations through institutions such as bride-price and damba. But there is another major institutional area, which we might regard as the rituals of Duna religion or as their ideological practices, an area also based upon circulation of pigs external to the domestic sector of production. Pigs are not only given as bride-price or damba, but they are all also eventually destined for killing, for distribution and consumption on ceremonial and ritual occasions. The rationality of these occasions in Duna understanding is based upon beliefs concerning ancestral powers, spirits and souls. There are then two forms of social rationality for the production of pigs, corresponding to the two major forms of circulation and distribution of the product. We may recognize these forms as those in which live pigs are handed over from one group to another, and those in which a group gathers together, kills and butchers pigs, and then distributes the pork, mostly to the same people who contributed the pigs. The corresponding rationalities are those of exchange and sacrifice.

Bride-price and *damba* are the major forms of exchange. *Damba* provides a rationality for production based on the symbolic substitution of pigs for human lives. The connection is implicit however, largely unacknowledged, as is the connection between bride-price and rights of sexual access. One simply "gives *damba*" or "marries a woman with pigs"; one does not enter into a consciously defined exchange of precisely defined values. But at a more immediate level than the level of principles and symbolic equivalences, at the level of everyday practice,

/17/

pigs are more obviously exchanged for people. When *dambā* is paid, the kin of the deceased stop their "crying" and "anger". Pigs have in effect been accepted for a life: either the life of the deceased, or the life of the further victim who would otherwise have died through the operation of *lex talionis*. Likewise, when bride-price is paid a woman is indeed acquired, although Duna will correctly deny "owning" her (and will hardly admit that they do indeed "own" rights of sexual access). The *de facto* reality is that the payers of bride-price acquire domestic labour-power and control over the reproduction and disposition of children within the society. The rationality of producing pigs for exchange is then that material production is effectively equivalent to the production of human life itself.

There is also that form of exchange, yoloya, in which pigs are given, bartered or sold for other commodities such as axes, salt cakes, gourds of oil, ropes of shells, magical spells and even land. Here the exchange is not for human lives but for means of production (axes, land, spells) and durable items of wealth (salt, shells, oil) which may also be consumed or worn as decoration. Perhaps it is because of the primary identification of pigs with human lives that Duna sometimes seem to prefer to conduct yoloya transactions with cowrie shells or salt rather than pigs. Indeed, cowrie shells (dange) have certain "diabolical" associations for the Duna which seem to set yoloya transactions apart. Duna do not know where the shells come from, but they think of them as the excremental "skin" of the tsiri dange ane," a fear-inspiring subterranean sprite who wears a red bachelor's wig and whose auwi has a prominent "anus". Such symbolic associations perhaps suggest an incipient differentiation of spheres of exchange, a separation of commodity barter from transactions involving human lives.

Forms of circulation in which pigs are killed and distributed include:

homestead sacrifices to *dama* when people are ill; funerary distributions accompanying secondary

burial;

- kaka, pigs killed when men are wounded in war;
- auwi rituals involving damene, paired lineage segments, entire parishes or pairs of parishes.

I say that the rationalities of these forms of circulation are rationalities of "sacrifice", although the term is not entirely appropriate in every instance.

In the case of sacrifices to dama (un-named and unknowable spirit beings who "haunt" to death a person and his/her descendants with illness), one or more pigs are killed at the house-site of the parent or grandparent believed to have been previously haunted. A ritual specialist who is painted half in black and half in red kills the pig(s) with a black and red striped baton. If the pig's "brains and blood"gush out of its nose, the *dama* has been found and the sacrifice will be followed by successful recovery. The residents of the homestead, their immediate neighbours and usually the sick person eat the pork. Although the ritual specialist may tell the *dama* to "take this pig and go away, leave us alone!", other specialists propose strategems to "blind the *dama*'s eyes" or otherwise drive it away, suggesting a less than sacrificial attitude.²

Funerary distributions (photographs 8a-d) formerly took place at the time of secondary burial, perhaps seven to nine months after a death, when the bones of the deceased would be removed from their elevated coffin at the homestead and transferred to an ossiary cave. In some instances bilateral kindred would join together, while in other cases the matrilateral and patrilateral *damene* of the deceased would hold separate distributions. Nowadays secondary burial has been prohibited (as have above-ground coffins), and funerary distributions are conducted some months earlier. When a day for the distribution has been set, kinsmen of the deceased kill one or sometimes two or three pigs each and carry the half-sides to the distribution. (Again, women contribute their half-interests along with their husband's). The sides of pork are lined up across a garden or clearning and a close kinsman briefly recalls that the distribution is in memory of



the deceased and then counts the number of half-sides assembled. Ι recorded distributions of from 10 to 70 half-sides. Distributions for women's deaths tend to be smaller than those for men, but sisters and wives of important men have larger distributions than those for unimportant men. The butchering and conduct of the distribution are rather complex, but realize the principle that "everyone gets an equal share", that is, that the assembled pork is divided among everyone recognizing a relationship to the deceased. So far as I could tell, women's shares were equal to men's shares, although men perhaps keep more lean meat for themselves while giving larger, fatty cuts to the women. At the time of my fieldwork there was some debate whether funerary distributions were contrary to Christian practice. The important question seemed to be whether the pigs killed were simply in commemoration of the deceased or actually intended as an offering to the departed soul-a moot theological distinction, although my most "traditional" informants insisted on the former interpretation. In the meanwhile, a "new custom" has emerged, in which baptisms and other church-related events are celebrated with distributions organized on similar principles. Although a number of traditional practices in relation to secondary burial expressed anxiety about the possible "anger" of the deceased against the living, people today say that they no longer fear the dead, since everyone who now dies has "heard the word of the mission".

Again, pigs killed as *kaka*, when men were wounded in war, were not explicitly seen as sacrificial offerings. The most I could elicit from informants were statements that a wounded man's spirit was apt to leave his body and cause death, and that if *kaka* pigs were not killed, spirit-loss was more likely. No *dama* or other power seems to have been invoked when *kaka* pigs were killed, but the rationality of the practices seems to have rested upon vague notions that the killing of pigs had some spiritual efficacy.

Auwi rituals have been discontinued in the Tumbudu Valley since at least 1960, though by my informants' accounts the major rituals organized by parish groups may have involved the killing and distribution of up to perhaps 300 pigs and would thus be analogous to the major pig festivals of other Highlands societies. These major *auvi* rituals focused on the ancestral soul of a parish or *damene* founder, or a relic left by the parish founder, although a wide variety of lesser *auvi* rituals were conducted by neighbourhood groups and even individual men for the *auwi* of *dama*, sprites, sun excrement and so forth.

Ancestral *auwi* or *auwi anoa hungunma* ("man's heart *auwi*") had a fairly elaborate set of beliefs associated with them, as well as an ancestrally-ordained sequence of eleven sacrifices (eight of one kind followed by three others) supposedly performed over a two or three generation period following the discovery of the *auwi*. As Paliawi of Horaile' explained it:

A man dies. His son won't see his *auwi*, nor his son's son. But when that man is dead, the great-grandson will see it.

Suppose a man dies and his descendants go elsewhere. The house-site is overgrown and the descendants are preoccupied with the auwi of their "mothers" [i.e. auwi of ancestors of their mothers' parishes]. The auwi comes up in the regrowth bush but they don't find it. It comes up and men start dying. Maybe one man of the group is still living in the area and he goes to look for the auwi at the old house-site. Sometimes he doesn't find it; he begins the first "tail-joint burning" anyway. Or maybe they find an auwi which is actually the son, but most of the men think it's the father. They do the himugu ritual and expect to be better, but men keep dying. So they realize there's still another auwi around. They go and look again: "Ah! there's the father's auwi!" He's been making them sick all the time but they didn't find him before. So they himugu him and the sickness stops.

The "tail-joint burning" is a minor ritual requiring the killing of a single pig and involving only locally resident men who recognize descent from the *auwi*-ancestor. The same ritual is performed eight times, whenever it is believed that the *auwi* is causing sickness within the lineage. After the eighth performance, "the man who found the auwi won't be alive, but his son will", and the lineage expects to perform himugu within the next five or six years. For the himugu ritual all known cognatic descendants of the ancestor, regardless of where they live, are invited to bring pig half-sides. A ritual specialist from Huli country is engaged and the *auwi* is buried to the accompanyment of the appropriate spells and planted over with a cordyline of the himugu variety. Pork is distributed in much the same way as for mortuary celebrations, although certain pork cuts are burnt as offerings to the *auwi*.

Once buried, the *auwi* is believed to work its way through the ground, following the roots of the cordyline to the surface. After perhaps ten years a minor local ritual is held to encourage the *auwi* on its way. Then there are no further rituals until the *auwi* reaches the surface, perhaps some thirty to sixty years later. Then the second major ritual, the last of the series, is performed:

Everything's going badly. There's one man there in the parish who realizes what the trouble is. He sees that his garden isn't doing well. His pigs are all scratching "themselves. They go to get pandanus nuts and they find that the possums have beaten them to it and eaten them all. Argh! This man is really angry about things. He thinks and then he calls together all the resident members of his damene. This man is a man who knows how to talk. Men listen to him. He tells them: "All right, I have something to say. Afterwards you can go and pass the word on to all our kin who aren't here now, whoever's living outside the parish. Things aren't well with me. My garden's no good and my pigs are scratching. I'd like to kill a few small pigs. I wonder if perhaps an ancestor of ours is angry with us or something?" He talks on like this. Some men who know nothing are there, and all the little boys who have come to the gathering just to They think to themselves "What's this man talking eat. about?" but the other men are thinking "Ah ha! The birdburying!" Some men there might say they haven't any pigs now, but everyone else says "Not so! We'll do it now!" Now that the topic has been raised they must go through with it. The auwi has heard them talking and will kill them all if they don't do it.

All right, they're going to do it in four days or something; they decide on the day. One man is appointed to go find a Huli man who knows the spells. Other men go tell all the descendants. They'll all come. No descendant would fail to come, even a man who's been away from the parish for years. Such a man will say "Thank you very much, I'll come. I've been away from the parish all this time and helping the men here with their *auwi*, just helping for no reason. But this is my own ancestor. I'll be there". After all, he knows that men don't come from nothing, from stones or trees or something. Also the women of the lineage will tell their husbands and they'll come just to help too.

Many pigs are killed and their flesh distributed "to everybody". The specialists from Huli country conduct ritual performances for three days and pour oil over the auwi, "putting it to sleep" or, some say, "killing it" so that it can no longer harm its descendants. Two young men, an agnate and a non-agnatic cognate, are chosen to spend a year in seclusion away from the sight of women in order to complete the heka hiwanda ("bird burying"). At the end of the year the people are told that they can henceforth forget about the auwi, that it is now a thing of no significance. The auwi which has thus acted as an iconic representation of a genealogical node, focusing the ritual organization of an increasingly larger group of people over the years, is then forgotten. People say that their ancestral auwi are like their immediate dead, "after awhile you forget about them and they leave you alone", but the process takes much longer. In any event, there are new auwi to think of, the sons and grand-sons of the auwi that has been "finished".

In addition to the major pig slaughters associated with ancestral *auwi hungunuma* there are also parish-wide rituals focusing on relics left by the parish founders. These relics remain a focus of periodic rituals perpetually, partly because they represent the unity of the parish and its ground, partly because they function as the chronological zero points of male-reckoned genealogical time. The rituals of *auwi hapia tsiho* ("*auwi* brought here before") seem to have been performed every ten to twenty years, and like the major rituals for *auwi hungunuma* they seem to have been prompted by perception of a crisis in production: crops are inadequate and people and pigs are unhealthy. Many pigs are killed and the pork distributed equally to

the men and women who have contributed. As in other *auwi* rituals, prohibitions of up to six months are imposed upon sexual intercourse, the kindling of new fires, the use of stone flake-tools, and the conduct of exchanges. People are encouraged to turn their efforts inward, away from thoughts of marriage or warfare and towards the preoccupations of gardens and homesteads.

On the basis of interviews with informants it does not seem possible to determine the rise and fall of pig populations within local groups over time in relation to the occurrences of the various major auwi rituals. However, it seems probable that if there were any tendency towards periodicity, the pig cycle would not have been determined by the occurrence of rituals, but rather the reverse. Natural increases in the pig population not off-set by sufficient consumption or prestations to other groups would have periodically resulted in a surplus of pigs greater than could be supported under the existing conditions of sweet potato production. The resulting unintentional crises are then interpreted in relation to the possible explanations offered by the sequence of rituals. Everything happens as if it is the auwi that determine the productivity of the gardens and the proper time for the rituals, while in actuality it is the relationship between local pig populations and horticultural production which indicates that rituals must be performed and therefore that it is time for them.³ In any case, it seems likely that the rituals have precisely the efficacy which Duna claim for them. With the pig population greatly reduced and the human population well-fed on pork and required to spend most of its time in gardening, increasing sweet potato production should soon exceed the greatly reduced demands of the local herd.

However, this is not the rationality of pig sacrifice as understood by the Duna. Above all, *auwi* are to be feared: "they could kill everybody!" Pigs are not killed to reduce the level of sweet potato consumption; for the Duna, pigs are sacrificed to appease the *auwi*, to make them return fertility to the soil and stop killing

people. Behind this logic of sacrifice lies the same notions of the substitutability of pigs for humans which has been found to underlie damba and bride-price: the earliest ancestors (the most powerful, frightening ancestors) sacrificed not pigs but humans to their auwi. The auwi of today, as embodiments of these ancestors, are still cannibalistically inclined. If ignored they may kill and eat men. Pig production for auwi rituals is therefore, again, a production of a substitute for human life. People must sacrifice pigs to auwi least they be "eaten" themselves.

* * *

With the exception of those few pigs that die of sickness and are then consumed yao ("for no reason") within the homestead, Duna pig production is directed into one or other of the two main divisions of circulation outside the homestead: pigs are either exchanged or sacrificed. When live pigs are exchanged, either by the lineage or by the individual, for brides or for axe blades or land or as damba, the exchange effects a transfer of pigs as substitute humans for the means of (re)producing humans: land, tools, labour-power, women as reproducers, and, in a sense, the preservation of life through the nullification of lex talionis. When pigs are killed and distributed as pork within the group, the end result of production is consumption: the existing population is maintained but nothing is added to the sum total of resources for production in the future. Furthermore, in the exchange of pigs men (and not women) gain in prestige and power. But pigs which are sacrificed are distributed equally between men and women, the women who produced the pigs receiving a measured half share. Men should therefore favour the allocation of production to exchange while women's interests are best promoted through practices of sacrifice. Men maintain their dominance through the circulation of pigs, and one way of maximizing available resources to this end is to minimize consumption. Duna men are not interested in increasing their production for their own greater consumption and enjoyment, but rather in the maximization of their "capital". In their case, "capital" is represented by their wives, by their live pigs available for exchange, and by the "credit" (called "prestige" by the anthropologist) built up through "helping" kin and extending the range of their allies

through payment of live pigs as *damba*. To kill and eat a pig represents a loss of social exchange power, a loss of the power to dominate, in exchange for the use-value of eating. Men then can best maintain their power by producing for circulation in exchange and not for consumption.

It seems that men are confronted by a dilemma in which their interests are best served by producing pigs only in order never to eat them. A myth expresses the humorous side of this predicament:

Once there was a man at Kunainda who didn't have an anus. He didn't shit at all. Whe he ate, he cooked everything and then ate the steam and smoke. He threw the food away and called it "shit". Another thing he was always doing wrong was using his legs as chopping blocks. When he wanted to cut a vine or something he'd cut it against his leg and then he'd cry in pain. This man! His thoughts were really confused.

The story goes on to relate how a man from across the valley, much in the manner of the hero in the story of the Yeru' cannibal people, "straightens out" the man without an anus. He teaches him the true value of food and cuts an anus into the man. An explosion of steam and excrement ensues, after which the Kunai' man feels much better. The cross-valley man teaches him to use a chopping block and so avoid mutilating his legs. The story-teller, Eyako of Horaile'-concludes by adding: "This really happened, it's a true story. We still call Kunai' men 'men with closed anuses' and 'men who can't think'." At its most obvious, the myth tells men that it is stupid to deny the use-value of food. But beyond this, the myth presents an image of a man who accumulates and retains contents inside himself until the pressure must be released by surgery and expulsion. Perhaps we may recognize an analogy with the lineage which accumulates pigs and then suddenly discharges them, either in socially valuable exchange or non-productive sacrificial consumption? In any case, the Kunai' man not only fails to properly eat and consume, but he chops at his own legs (tsia) as well. To Duna this means to cut off one's existence from one's base (tse), to damage the generative foundations of one's being. Perhaps it is not surprising then that to exchange wins praise from other men but no response from the ancestors. The ancestors

who are the "basis" of the lineage and control the powers of fertility and growth, are only pleased when pigs are killed and consumed. Thus, while the interests of living men would seem to be best served by the accumulation of un-eaten pigs for exchange, the ancestors require that pigs be killed and consumed for production to continue at all.

But the dilemma of consumption versus exchange also has an horrific aspect which may be glimpsed in the cannibalistic impulses that Duna attribute not only to their ancestors but to many of the *dama* of the forest. Most terrifying of all is the *Karukua dama*, a being of the high forests of the McNicoll Mts., on the route which Duna must take to reach the salt sources of Enga country:

This *dama* comes up to you and makes a noise: Uuum! a deep hum like an aeroplane. Then he goes inside you, just as a witch goes inside a person. Now you yourself say "Uuuum!" Now you pull your own nose off and eat it! You tear your ears off and claw your eyes out and eat them. You rip your lips off, so you're all torn, just a mess, and you eat your own lips. You pull off your penis and balls and eat them! You eat yourself entirely. Your own arms and legs you eat. That's what this *dama* is like (Dalipa of Aiyuguli, March 1972).

More than a single intepretation is of course possible. Yet the Karukua dama seems an almost transparent declaration that Duna fear (and fantasize) that they will devour themselves if they are separated from the bonds of sociality by entering the uninhabited forests. The urge to consume (and so have nothing left to exchange) seems so great that it must be attributed to the unrecognized dama/other who is actually one's self-just as it is necessary for Duna to sacrifice to their ancestors in order to themselves eat pigs. Certainly men, as much as women, desire to eat pig, but the social rationality of producing for exchange forbids them. The conflict between the contradictory aims of accumulation and consumption appears so great that Duna are able to consume only on the condition that the ancestors demand it, indeed that the ancestors be thought of as "eating" the sacrificed pigs, since men do not wish to take responsibility for consuming their production themselves.

"F-

Duna believe that spiritual powers are the ultimate basis (*tse*) of material production and human reproduction. Moreover, men believe (and women seem to accept) that it is they alone who possess the magico-religious knowledge necessary to control the powers of fertility and growth. We may regard this as a simple mystification of the real basis of power in their society, but we must also recognize that in the conjuncture between production and ritual the actual contradictions between consumption and accumulative production are explained and magicked away.

The final obstacles to the accumulation of pigs in Duna society are the existing forces and relations of production. This is manifested most clearly in the periodic crises of over-production. The source of these crises would seem to be that the accumulation of pigs for exchange has outstripped the capacities of people to produce food for them. If the conditions of production could be altered the crisis might be averted and even higher ratios of pigs to persons reached. But at any given moment, the conditions are as they are. There is no choice but a mass liquidation of the capital which men have been accumulating for exchange. In relation to the existing forces and relations of production, there has been too much production and not enough consumption. The men conceal the nature of the crisis (from themselves as well as from the women) by conceptualizing it as a necessary sacrifice, a sacrifice that must be made if production is to continue. More: the ideology of this sacrifice countermands the loss of male exchange power by a gain in non-material spiritual power, by appealing to exclusively male relationships with the powers of the auwi-ancestors.

Duna ideology asserts that only men have souls which become auwi. Only auwi can restore fertility to the ground and health to the people when human effort alone is not enough. When, as a result of periodic crises, recourse to auwi is necessary, then the relationship which are activated to bring the group through the crisis are the agnatically-biased relationships of the descent group as a financial

corporation. As the soul-icons of the male ancestors, auwi function as materialized nodes of the recognized genealogical structure of men related to men. Each ritual for an ancestral auwi brings together the male cognatic descendants of the ancestor from wherever they may be currently residing. They are enjoined to sacrifice pigs (socially acceptable form of consumption) and share in the eating of pork as "brothers", as men bonded, through the social distribution of excess product. But note that the women who receive pork, although they receive as much as the men do, are for the most part not related. They are mostly the wives of men of the group; they receive their fair share, but the relationships among them are not reinforced. The men, on the other hand, reinforce by the "false" consumption of sacrifice the same structure of relations which in other times will act again as the structure of accumulation, the lineage as a mechanism of the accumulation of pigs for exchange. The basis of power in Duna society which lies behind the auwi is simply the historically derived and sacrificially perpetuated structure of male relations.

Power rests upon the domination of women within the production process, and on the structure of male-male relationships mediated by the practices of social exchange and sacrifice. The conditions for the production and reproduction of relations among men are the conditions of material production buttressed by an ideology of exclusively male access to spiritual power. Auwi appear to embody real power for the Duna because they are emblems of the male-dominated social network. But appearances to the contrary, auwi conceal the truth: Duna belief in auwi denies the realities of the power of social relations and material production in the present by continually attributing "true" power to the past. It seems that the male-biased structure of relationships exists in the present not because men have reproduced past relations through the continual circulation of surplus product, but simply because the ancestors have decreed it. The production of crops and of pigs, and even the reproduction of people, is made to rest not upon the efforts of living humans but rather upon the continuing intervention of dead ancestors. (Ironically, they manifest themselves as mystified artifacts, unrecognized

/17/

materializations of pre-historic labour).

So, from the point of view of material production and the maintenance of male interests, it would seem better to exchange pigs than to consume them; but ideological beliefs about auwi as the source of fertility decree sacrifice rather than accumulation. In any case, men are desirous of eating pig whether it is socially permissible or not, and in the last analysis the number of pigs that can be maintained for men's prestigious exchanges is limited by the existing regime of production. The contradiction between exchange and sacrifice is dissolved by the ideology of consumption. Since production is geared to exchange and not to consumption, periodic liquidations of capital cannot be avoided. But the location of this liquidation within the field of ritual behaviour, under the guise of an appeasement of ancestral powers to which men alone have access, ensure that even in providing the unplanned wherewithal of consumption, the relations of production and appropriation are strengthened and male domination assured.

Kiria Pulu

There remains the cap-stone of the Duna ideological edifice, the cult of *Kiria Pulu*. The words seem to mean "burnt skin", though none of my informants would say that they meant more than the name of the cult itself. The central feature of the cult is a ritual in which the initiates whip and beat one another. A very similar ritual, perhaps the same, has been observed among the Huli by Glasse (1965, 1968), and described as well by a missionary (Berard 1957) and a journalist (Gaisseau 1956).

Neither the practices nor the ideology of *Kiria Pulu* resemble the local parish and lineage cults of the *auwi*. Although some pigs were exchanged and eaten as a part of the *Kiria*, the cult has no immediate articulation with either production or consumption. Nor does the cult emphasize relations of kinship which are the relations of

production of Duna society. Kiria membership was open to any man willing to submit to the ordeal, and each performance brought together men from many different parishes. Kiria cult houses were often erected on boundaries between parishes and the cult was said to belong to the men of the Kiria rather than to any local group. At the conclusion of each ritual performance the house of the Kiria would be abandoned and the sponsoring parish or parishes prohibited from enacting another performance for a generation. The Kiria men would agree among themselves where they would next meet, thus moving the cult from place to place about the country. Initiation into the Kiria Pulu was in fact a precondition for the performance of auwi rituals, and each man who "went inside" his own parish's founder-relic cult had to participate at least once in Kiria Pulu. Kiria was thus a panlocal cult initiating men into a Duna priesthood, such that the political-economic autonomous groups of the country were ritually dependent upon the circulating association of cult performers who represented neither territorial, kinship nor political-economic interests. I know of no exact ethnographic parallels. The hierarchical initiation cult at Telefolmin, with its regional association of local chapters (Barth 1971) would seem to be a homologue, though its organization was territorially fixed rather than circulating. Voluntary secret societies and rank-taking societies in New Britain and the northern New Hebrides also offer parallels (Wedgwood 1930), although they emphasized articulations between rank and wealth rather than between rank and repeated submission to punishment.

The few accounts I have of *Kiria Pulu* (I have never seen it) suggest considerable variation in the rituals as performed at different localities. The basic framework of the ritual, however, seems constant:

"A man who isn't in the *Kiria* yet is asked by his kinsmen, his brothers or cousins, to go 'inside' so that he can see what is done. He will say 'all right, I'll go inside, but who will cut off my head when I'm dead?' Another kinsman, an *apa*, will say, 'we'll go inside together. If you die first, I'll cut off your head. If I die first you can cut off mine' (Pururu and Kuria of Horaile'). The kinship relation of *apa* is a reciprocal one between men who are descended from a pair of opposite-sex siblings. All men who entered the *Kiria* did so in pairs, though the reciprocal use of the term "*apa*" between them was often adopted only as a consequence of participation together in the cult.

The cult house is built on a pattern unlike any other Duna house, with a long, narrow floor plan and a sloping ridge pole. The entrance is at the low end and there is an exit under the high end. Before the entrance is a simple shelter called the "dog's Kiria". The cult house proper is called konowa anda, "the house of sorrow". Fires are built down the length of the house and the new initiates are required to run the length of the building in the dark, over the burning embers, while the second and third grade initiates lash at them from the archways of the chamber. New initiates are beaten intermittently outside the house during the day preceding the performance, but when the final ordeal comes they are saved from running the full length of the gauntlet. A friend or distant kinsman who is a second or third grade initiate will pull the konowa nane ("sorrowful boy") against the wall and exchange places with him in the dark: "All day we have beaten you, and now it's your turn to beat us". The second and third grade initiates then run the gauntlet composed of the new initiates. Again, men may be rescued from the ordeal:

"But some men are not saved. Their friends and kin bear some grudge against them and allow the beating to go on. These men must run the entire length of the house and out through the door where they fall on the ground and lie vomiting".

When the ordeal is finished the initiates retire to a meal of pork and vegetables, conducted by men disguised as wild pigs or as women (who perform gardening in reverse, un-making sweet potato mounds). Only the *Kiria huri*, the men who have been "inside" four or more times, are exempt from the beatings. Their task is to laboriously clean, polish and paint the skulls of the former *Kiria* men, so that they may be displayed to the community at large at the end of the performance.

Glasse's Huli informants stressed that the ritualized violence of their Tege Pulu allowed men to express hostilities against one another so that they had a "good feeling" afterwards. In contrast, my Duna informants unanamously expressed fear of the Kiria. This attitude towards the cult may perhaps explain its most singular characteristic in relation to the concerns of this thesis: so far as the Duna of the Tumbudu are concerned, the Kiria as an institution is absent from the ethnographic present. The ancestors knew of the Kiria and gave instructions that it should be performed "later", but the ancestors themselves did not perform the ritual, nor had any attempt to realize a performance in the Tumbudu Valley completely succeeded. At Horailenda I was told that the parish founder had marked the spot where the cult house should be erected. But when the men of Horaile attempted the ritual four generations ago the parish was split by war and no attempt was made again. At Hagini' I was told that a Kiria house had been erected once, but the performance was abandoned when no one could be found who knew the necessary spells. Further up the valley, a joint cult house had been built by the men of Porini' and Yakuni', but the men of the two parishes disputed who should enter the house first and a war broke out. A very elderly informant said that there had in fact been a Kiria there when he was a boy, but that no ritual had been performed because:

"That is the custom of the Kiria. Whenever you make a Kiria you must first build the house for nothing. You build it and leave it so that it rots and falls to Later on you can build it again and go inside". pieces. Across the Tumbudu River at Malanenda they had attempted a Kiria but were unable to accumulate sufficient pigs and cowrie shells to finance the purchase of cult spells from specialists. Further up valley two other parishes had again attempted a joint Kiria about 1925, but the principal organizer was killed in a fight. At Kiparianda I was told that the Kiria was performed by the Huli-speaking groups at the head of the valley, but that none of the Duna had ever performed it: "Our ancestors said that we would do it later on. We thought that the Kiria was something big, not just nothing. Our ancestors didn't do it, so how were we to do it?"

×. .

For the Duna of the Tumbudu, the Kiria was a ritual ordained by the ancestors, participated in by local cult leaders (who attended performances in the upper Pori Valley), fundamental to the operation of local cults, and yet one which no parish had succeeded in performing. Moreover, where the Kiria was performed it seemed to have no substantial articulation to systems of production and distribution. Apart from its validation of local auwi rituals, it does not seem to promote an ideology directly concerned with relations of kinship and production. What then is the Kiria about? Clearly, it operates to create a regional hierarchy of ritual specialists. But the hierarchy seems to lack any basis in political economy or material production. The hierarchy of the Kiria is a hierarchy based on planned violence, the experience of fear, and surviving fear in the company of others. What is the fear? My informants offered that it was a realistic appraisal of how badly one could be hurt at the hands of "other men". But they also suggested that they were afraid of the By unknown, of not knowing what actually happened inside the Kiria. the construction plan of the house, the running of the gauntlet, and by farcical scenes enacted within the house, it seems clear that on the level of psyche the mystery of the Kiria is the mystery of all real male initiations, the mystery of the monster that devours and gives birth to "new men". Thus the fear of encountering other men is combined with the symbolically produced fear of being born again in an encounter of self and other. Several additional features point to the Kiria as an encounter of self: the emphasis upon reciprocity of apa, the role reversals between new initiates and middle-grade initiates, and subseauent episodes of obscenity between the middlegrade men and the senior Kiria huri. Finally, when a man goes "inside" the Kiria he is allowed for the first time to eat cassowary, widely regarded as an ancestral totem of most Tumbudu people, a totem from the Ok area. When a man "has Kiria upon him", then he may eat his The point of encountering oneself among the sybolic ancestor/father. Duna returns to the attraction of devouring one's self.

At the time of the ethnographic present, the Duna of the Tumbudu had yet to realize this encounter. The Huli attitude of "good feeling" about the cult and the pre-validation of its performance in the Tumbudu area by the ancestors both suggest that the cult is not an institution of the Duna as they were, but only as they were becoming. The Tumbudu Kiria is properly located within the ethnographic future.

Unlike the auwi which, I have suggested, functioned to assure the reproduction of the conditions of production in Duna country, the Kiria seems to have represented an elaboration and enactment of emerging forms without any substantial materiality. But in a sense, this insubstantiality appears more real than the actual material production of economic values. For if the rationality of social production among the Duna is that pigs are a substitute for people, a displacement in the realm of the material (equivalent to a sublimation in the realm of the individual psyche), then the encounter of other men and of one's self and fears within the Kiria becomes the reverse. Instead of the mysterious production of pigs which stand not for what they are but for people, within the Kiria it may be that men discover a de-mystifying production of themselves. Perhaps the Kiria accomplishes a transformation of human relationships by a process in some sense the opposite of material production. The Kiria begins with men's immaterial fears and produces a semblance of a new reality.

There are certain features of the *Kiria* which offer an analogy with social forms of material production among the high-intensity economies of the Enga and Hagen peoples. The dominant politicaleconomic institutions of these peoples are the *Te* and *Moka*. These institutions create a regional integration of economic activity by an enchainment of prestations between local groups. In contrast with the unplanned-for ritual slaughters of the Duna, the *Te* and *Moka* operate as planned pig cycles in which the productive forces of each local group are consciously organized in relation to expected events: the arrival of the *Moka* or *Te* as an exchange handed on from group to group. Furthermore, in contrast to *auwi* rituals as sacrifices, the

Te and Moka realize each local group's pig cycle as a prestigebuilding episode of exchange. A cycle of horticultural labour appears to operate as much among the Duna as among other Highlands peoples, but the allocation of production has been transfered in societies with planned regional cycles from sacrifice to exchange as the dominant mode of economy. These developments no doubt have much to do with the higher production levels achieved.

Articulations of kinship with these exchange system achieve a more harmonious operation of domestic relations of production, since wives are chosen with exchange partnerships in mind. Women are able to view their productive work as benefitting their own brothers directly through exchange, and consequently to view their husband's advancement as an advancement of their own interests. In Hagen society, particularly, the antagonistic relations between the sexes which so characterize relations of production among the Duna seem all but transformed into a new set of relations, the division of the clan into wealthy and poor, the fundamental pre-condition for antagonistic relations between men as classes.

Like *Te* and *Moka*, the *Kiria* offers a basis for regional organization. The cult belongs to no local group but is passed on from parish to parish throughout the country. Like *Te* and *Moka* the *Kiria* creates a hierarchy of men, albeit men distinguished by their non-material achievements in the world of ritual rather than within the actualities of economic production. The *Kiria* would seem to produce an ordering among men on the basis of immaterial realities (knowledge of self) rather than on the basis of mystifying material exchanges of pigs standing for people.

There is even a fragmentary myth associated with the Kiria suggesting a prefigurement of an institution like Te or Moka. The sites of the Kiria houses of the Pori Valley are said to have been the sleeping-places of an ancestral woman who traversed the country following a striped pig. Several of my informants said that they

thought the *Kiria* had something to do with a re-enactment of this origin, such that the parishes of the Tumbudu should (or perhaps did?) co-operate in passing a single striped pig back again, from Huli country to the Strickland. Perhaps this mythic memory, together with the regional organization and ritual hierarchy created by the *Kiria*, may be viewed as "seeds" of some possible Duna version of a *Te/Moka* in an ethnographic future. The *Kiria* might then be understood as an attempt to realize in ritual practice, on the basis of immaterial relations among men, an image of how men might *actually* be linked in some future mode of intensified material production.

296.

But even if men first realize in their imaginations what they afterwards effect in their material practice, it remains the case that the seeds of future relations of production cannot germinate without appropriate material conditions. The *Kiria* presumably remains a religious inversion of the *Moka* or *Te* because those who perform it lack the material conditions necessary for further intensification, both of their material production and of the relations of exchange which rest upon it. Perhaps this is why the Tumbudu people have failed in their attempts to realize the *Kiria*, and why, where it is realized, the performance represents so many reversals and contradictions. Men can imagine new forms of social relations and practice them in ritual, but social transformation requires the reconstruction of imagined relations within a real political economy.



Appendix One : Age structure and population dynamics in Highlands societies

In the absence of historical records other than oral traditions of uncertain value, examination of the age structure of a population can provide valuable insight into conditions affecting the population in the recent past, as well as some indication of possible future trends. Demographic age-profiles are in fact among the best objective indices of the dynamic behaviour of a society, and contemplation of a collection of profiles from the New Guinea Highlands may provide support for the adoption of dynamic perspectives in other areas where objective evidence is more deficient.

However, the interpretation of age-profiles for New Guinea societies is a difficult and uncertain affair. Age estimates are unreliable where there are no birth records, and we lack information about the underlying fertility and mortality patterns which account for the size of age cohorts. But by the use of methods of "social triangulation" (Appell 1969), a field worker dealing with a small population can arrive at age estimates that may be accepted with some degree of confidence. When profiles arrived at by these means match profiles based on larger populations derived from government census figures, confidence is further increased.

An age-profile of the classical pyramid or inverted-funnel shape indicates a growing population, with the growth rate roughly proportional to the size of the base of the profile. Bottle-shaped profiles indicate static populations, while a profile-base narrower than its superstructure indicates a population entering decline. Since the size of an age cohort is a function of both the number of births into that cohort and of cumulated mortality reducing those births, a sudden contraction in the size of a particular cohort can be due to reduced fertility, increased mortality or both. As well, contraction or expansion in a cohort tends to produce corresponding effects in succeeding cohorts 15 to 25 years later, among the children of the originally affected cohort. Actual age structures thus often have undulating profiles rather than a smoothly stepped appearance.

Figure 1 represents a profile constructed from administration census data for Horailenda in 1967. The age estimates and enumeration were made by W.A. Cawthorne, a conscientious field officer to judge from his patrol reports and excellent maps of the area. The profile appears somewhat top-heavy, with an unaccountably large number of men aged 35 - 39 and signs of serious depletion of the 20 - 29 age cohorts. Figure 2 presents my own data for Horailenda as I censused it in August and September of 1970. Cawthorne's original census proved reliable, and the net change from births, deaths, in-migrations and out-migrations totalled two persons, with slightly larger changes in the sex ratio. I modified Cawthorne's original age estimates on the basis of information about sibling birth orders and marital histories, and with particular reference to the fixed point in time provided by the Fox brothers' contact in 1935. The resulting profile has a more normal appearance, though the distinctive features of Cawthorne's data still seem present. In particular, the large cohort of men aged 35 - 39 remains, although the passage of time and re-estimates of age have displaced it upwards and reduced its magnitude. The apparent depletion of cohorts born between 1938 and 1947 also remains in the 1936 to 1945 male cohorts of the 1970 census, but is not so apparent in the female cohorts. A further depletion not apparent in the earlier census appears in the 1926 - 1930 cohort.

Figure 3 represents the age-profile in 1971 at Kelabo (Kiparianda-Nokuani) in the more densely populated part of the Tumbudu Valley. Based on administration census data, it seems unlikely that the age estimates would be as accurate as my Horailenda census, but the larger size of the population (710 as compared with 344) should cancel out some chance irregularities. The overall profile is very similar to the Horailenda 1970 age structure. The bulge of older men now appears smoothed out and the 1926 - 1930 depletion has disappeared. However, clear signs of depletion in the 1937 - 1956 cohorts of both sexes still remain, as well as unusual



Figure 2. Age/sex structure of Horailenda, anthropological census, 1970





Figure 4. Superimposed age/sex profiles.


bulges in the female 0 - 4 and 35 - 39 cohorts.

A more general picture can be obtained by superimposing different profiles (figure 4.) Combining the Horaile' and Kelabo profiles, the Tumbudu Duna appear as a slowly growing population which has suffered a considerable set-back at some time after ca. 1930 - 1935. Had it not been for this set-back the present population would be considerably larger and the growth rate presumably higher. Similar cohort depletions have in fact already been noted by Bowers (1971) in Chimbu, Maring, Fore, Gimi, Kakoli (Kaugel Valley, Tambul Patrol Post) and Mendi data. I have included in figure 4 a profile derived from Bowers' 1962 Kakoli census, displaced upwards by ten years to account for the passage of time. The general correspondence among all these profiles suggests that the depletion is a pan-Highlands phenomenon and not simply a local occurrence. The most likely explanation would seem to be epidemics of influenza, dysentery or perhaps meningitis following European contacts elsewhere in the Highlands.

Duna informants were well aware of the occurence of epidemics at about the time indicated in the profiles. According to Yopa of Horaile' there were three serious epidemics. The first and most devastating occurred when Yopa was about 12 years old (ca. 1932 - 1935). There were multiple deaths in almost every homestead; one man recalled losing his mother, wife and sister all in the same day. Another informant recalled that "no one bothered to call for a divination-man to tell us what *dama* ("spirit-being") killing us; even the diviners were sick!" A second epidemic occurred sometime between 1940 and 1945, and the third (according to Yopa) after the plane crash at Lake Kopiago in 1957. Sinclair (1966:131) also records evidence of many deaths from malaria at Kopiago in 1955.

There was wide agreement among my informants that the population of the lower Tumbudu Valley had been much larger prior to the epidemics. Wakuni and Kunainda parishes had become almost completely depopulated and Horailenda men were able to point out areas of garden-fallow which had formerly served the larger population but were now considered to be above the altitude limit for worthwhile cultivation.

Through the use of advanced demographic techniques Bowers was able to arrive at an estimate of the pre-epidemic (ca. 1940) population of the Kakoli clan in which she conducted her fieldwork. This estimate, 939 persons compared with 736 in 1962, agreed nicely with an independent estimate of 946 based on observed population to male clubhouse ratios and the known number of clubhouses extant ca. 1940. If one were to assume similar ratios (i.e. 1940 populations approximately 1.3 times larger than 1960 populations) for the Duna, this would suggest a pre-epidemic Horailenda population of around 400, and a population for the Tumbudu Valley of around 6,225 as compared with 5,500 in 1970. On the basis of the further assumption of a constant population to clan dance-ground ratio, it appears that the pre-epidemic Kakoli population of 1940 had grown out of a much smaller population at a rate of around 1.5% per year (Bowers 1968, 1971). Similar assumptions for the Duna would thus yield a population of around 150 for Horaile' and 2,300 for the Tumbudu in 1870.

Age structure data are also available for the Hewa and the Huli, though in neither case was an attempt made to estimate ages into five-year cohorts. Steadman (1971:14) employed 10-year cohorts in his census of the Hewa population between Lake Kopiago and the Lagaip River in 1968. Figure 5 presents Steadman's original data in solid-line profile and a smoothed representation of hypothetical 5-year cohorts in broken-line profile. I arrived at the smoothed profile by keeping numbers within 10-year cohorts constant to the original data while contracting and expanding 5-year cohorts in line with the profiles in figure 4. The results suggest that the Hewa male age structure is not unlike that of the other populations considered so far, although depletion in the 1934 to 1948 cohorts The Hewa female age structure on seems to have been less severe. the other hand appears quite unusual. There is an apparent dearth of women between the ages of 30 and 40, and an excess between 20 and 30.

Figure 5.

Age/sex structure of the southern Hewa, anthropological census data from Steadman 1971:14



Figure 6. Age/sex structure at Central Tari, crude data for Tunda parish (Glasse 1968:33) and hypothetical profile



There are also too few females 0 - 19, and the 0 - 9 cohort appears particularly depleted in relation to the childbearing 20 to 29 cohort. Steadman thinks that his Hewa informants may have failed to report all their female children, while older Hewa women are often accused of witchcraft and killed (Steadman 1971, 1976). Neither factor can explain the large number of women in the 20 - 30 cohorts, and if Steadman's census is correct on this point then even the number of male children recorded is somewhat less than should be expected. It appears that the Hewa population may be approaching a static point of no growth or perhaps even decline.

In contrast, the Huli population censused by Glasse (1968:33) appears to be growing rapidly. Unfortunately, Glasse presents his data in terms of two age categories only, under 15 and over 15, but the size of the under 15 cohort is somewhat larger than in either the Horaile' or Kelabo Duna census. Moreover, Glasse's census was conducted in 1959 when the presumably depleted 1930 - 1944 cohorts would be passing through their period of maximum fertility (hypothetical smoothed profile, figure 6). The number of children in the population therefore seems indicative of an even greater growth rate than the crude data alone suggest.

Appendix Two :

Empirical/empiricist investigations into homestead composition and production

1. 20

A common assumption in investigations proceeding from empiricist epistemologies is that scientifically valid propositions can be derived from unbiased consideration of associations or correlations present in a body of empirically derived data. The categories within which the data are recorded and their dimensions of variation are assumed to be empirically "given facts" in the nature of reality, their selection guided by the character of the problem under investigation. More realistically, it can be observed that the categories of data and analysis are usually derived from paradigms within the existing state of each science, from implicit and often unthoughtful assumptions about what is important and in relation to what. That the categories of data and analysis always represent a pre-existing bias in relation to the problem, as does the problematic itself, is often not recognised. Even worse, within such empiricist conceptions of scientific knowledge, it may be assumed that the object of scientific investigation is a model of reality, derived by a process of abstraction, and displaying the significant properties and relationships of reality in terms of associations or correlations among the originally employed ("given by the facts") categories of empirical data collection and analysis. Thus, to cite an example from social anthropology, Glasse (1968) concluded his study of the Huli cognatic descent system with the statement that:

The significance of the study lies not in the general conclusion that Huli society is essentially cognatic, but in the relationships that were discovered to exist among the variables. It is not possible to predict the behaviour of an individual in Huli society, but given a certain fact about a person's status, such as his mode of affiliation to a group, it is possible to assess the likelihood that he will be a land-holder (or a non-land-holder), a unilocal (or multilocal) resident or that he will belong in any of the other categories that have been the subject of analysis. It is in the cumulation of such statements of probability that the structure of the society consists (1968:141-42).

That is to say, the object of scientific investigation ("the structure of the society") consists in a set of statements about the probability of association of the several variables or categories under investigation. Glasse does not ask why he has assumed that variables like mode of descent affiliation and land-holding are of significance, neither does he seem particularly aware that a statistical statement of the probability of association of variables can never explain or reveal in itself why or how the relationships are as they are, what the mechanisms might be by which we can understand their particular form of relation. Like other anthropologists (e.g. Leach 1961), he assumes that statistical norms are in some way related to jural rules, to explicit statements by actors within the system as to how they think their system works (or should work). But the connection is far from clear, particularly since both Glasse and Leach discount to some extent the conscious notions of the actors and emphasise instead the priority of statistical For Leach (as for Levi-Strauss), statistical norms are norms . apparently the outcome of the operation of unconscious structures, either located within the minds of the actors (Levi-Strauss) or externally, in the fabric of the material conditions of social existence (Leach). Glasse does not even assay this problem.

By contrast, the non-empiricist scientist begins with the recognition that he/she must take full and active responsibility for the categories of data collection and analysis, that responsibility for the categories of our knowledge cannot be foisted off onto reality. In consequence, the object of non-empiricist science is the construction of a theoretical object of knowledge, not an abstract model of reality. Both intuition and conscious reason play a role in the construction of theoretical objects of knowledge, and empirical research derived from the explicitly constructed categories of theory is employed to check the theory against actual concrete situations -to see if concrete reality is illuminated by theory, but not to see if the theory can be falsified by some aspect of "empirical reality" As one recent non-empiricist philosopher of science so-called. (Feyerabend 1975) has in effect argued, the only good test of a

theory is whether you like it or not. Concrete reality, according to the degree in which it is illuminated by a particular theory, guides us in our preference for thinking one theory-object rather than another, but it does not prove or disprove non-empiricist theory.

Empirical research is a scientific method for both empiricist and non-empiricist sciences. Marxists, however, tend to denigrate its role in relation to theoretical thinking, while empiricist scientists often seem to make of it a shibboleth in place of theoretical thought. Misunderstandings abound. To illustrate this point I shall review several empirical investigations I have made into the association of the "facts" of workforce composition of Horailenda homesteads (as production units) with the "facts" of pig production data as I recorded them in verbal interviews with homestead heads.

A point to be appreciated by the reader at the outset: in aiming for a non-empiricist conception of the mode of production I have myself been struggling with unfamiliar forms of thought, struggling against deeply ingrained empiricist tendencies. Thinking that the crucial question is whether or not exploitation takes place within the mode of production, I have been repeatedly tempted to fall back upon empiricist formulations of the problem, to try to force from the "facts" an answer to my question. I failed to appreciate that the facts could never answer the question, that I myself had to take responsibility for deciding whether or not exploitation was a feature of the mode of production - on the basis of my construction of the I repeatedly confused the object of my theoretical object. study, thinking that I could empirically derive the mode of production among the Duna, not recognising that I had to produce a concept of mode of production appropriate to the Duna.

As a measure of my eventual success in non-empiricist thinking, none of my empiricist investigations has appeared to me necessary or even properly relevant to the exposition of the mode of production as it now appears. I would go so far as to say that although it may be a matter of some interest, it is nevertheless a matter of no

consequence for the theoretical object that certain of these findings appear contrary to expectations derived from the theory. The relevance of these investigations is not that they have guided the construction of my theory (for I have had to reject the conclusions suggested by these investigations in no matter which direction they have pointed), but rather that an appreciation of their irrelevance may help to bridge the gap between empirical and non-empirical thinking, may lead empiricist-minded readers to an appreciation of what Althusser (1968) has referred to as "Marx's immense theoretical revolution", the epistemological break between empiricist and nonempiricist thinking.

I began my empiricist investigations with a determination of the Chayanov and empirical slopes of domestic intensity of production following the methods provided by Sahlins. In figure 1 I have plotted the consumers per worker ratio in the 29 homesteads of the sample presented in section / 8/ (table:8.6) against the average intensity of work per worker within each homestead. Workers are reckoned as "worker units" as detailed above (p.). Consumers are calculated as standardised "consumer units" on the following basis: adult and adolescent males over the apparent age of 15 years are counted as 1.0 consumer unit each; adult and adolescent females are counted as 0.7 consumer units each; and children under 15 as 0.5 consumer units. These weightings are based on my estimates of average daily consumption of horticultural produce. I have not attempted to estimate weighted average consumptions of pork, although I believe they would probably be proportional to consumption of horticultural produce. Intensity of work I reckon as pig production in terms of my "composite statistic" (p. , above) divided by Sahlins employed area under cultivation per household worker units. as his measure of the intensity of work in the Mazulu example, while he used sweet potato production as his datum base in the Botukebo I have chosen pig production as the best measure (Kapauku) example. 2a & b and 3 a & b show, there is little since, as figures correlation between area under cultivation and either worker or consumer units, while pig production appears to correlate in some



Figure 1.

 Empirical and Chayanov slopes of homestead labour-intensity, expressed as pig production and domestic consumption. Horailenda, 1970-71.

Figure 2a. Worker units and ha under cultivation, per homestead



Figure 3a. Consumer units (people only) and areas under cultivation per homestead



Figure 3b. Consumer units (people only) and pigs per homestead



small degree with both.

Several consequences follow from the decision to take pig production as a measure of labour intensity. Since pig production can be taken as nominally representing surplus product, the plot of domestic labour intensity becomes a plot of the intensity of surplus Since there is no evidence to the contrary, I assume production. that each homestead is able to meet its consumption needs for horticultural produce out of its own product, so far as human consumption requirements are concerned. Assuming no significant redistributions of plant produce between homesteads for human consumption entails the conclusion that if everyone maintains the same standards of vegetable consumption, the domestic intensity of horticultural production for human consumption must follow the Chayanov slope. That is, workers in homesteads with more dependent consumers per worker must work harder than workers in homesteads with However, as the Chayanov plot indicates, low consumer/worker ratios. the range of consumer/worker ratios in Duna homesteads is not very large and, in any case, Duna consider that plant production for direct human consumption is an unimportant factor in total labour by comparison with production for consumption by pigs.

So far as the plot represents the domestic intensity of surplus production, several conclusions can be drawn. First, the scatter of dots reveals no trend likely to be of statistical significance in the relation between intensity of domestic labour and homestead consumers/ From the scatter distribution alone, it appears worker composition. that homesteads with low consumers/worker ratios are more likely to operate at average labour intensities, while homesteads with higher ratios are as likely to deviate in the direction of lower labour intensities as towards higher intensities. Leaving aside the statistical significance of the distribution, the empirical slope (I) is computed as a linear regression according to the usual formulae. The slope (y = 1.04 + 0.03x) is all but flat, indicating no empirical trend towards the realisation of Chayanov's Rule. That is, so far as surplus production is concerned, all homesteads regardless of their

consumers/worker composition tend to work at the same labour intensity per worker. There are variations in labour intensity - Koria's homestead, for example, works almost 1000% harder than Tsona's - but these variations show no trend in relation to homestead composition as consumers/worker.

The Chayanov slope (C) can be reckoned as the slope postulated by Chayanov's Rule, that is, as the slope of domestic labour intensity which would be realised if homesteads tended to regulate their pig production in relation to a constant standard of pork consumption. Since the average intensity of production at average homestead composition is 1.09 pigs/worker at 1.08 consumers/worker (the encircled point M), the Chayanov slope is 1.09/1.08 per 1.0 increase in the consumers/worker ratio (= 1.0175/1.0). That is, if each homestead tends to produce pigs for its own internal consumption alone, the domestic intensity of production must increase by one pig for each additional consumer per worker. Since I have assumed that the subsistence standard defining the Chayanov slope is a relative standard defined by average pig production in relation to average homestead composition, the Chayanov slope must necessarily pass through Sahlins, on the other hand, tries to define subsistence point M. in absolute terms, in relation to some notion of average minimal It is therefore possible in his analyses consumption requirements. for the empirical slope of intensity at point M to pass above or below the Chayanov slope.

What can be concluded from the relationship between the empirical and Chayanov slopes for Duna pig production-domestic work intensity? While I have reasoned that vegetable production for human consumption within the homestead presumably follows a Chayanov slope, pig production shows no such trend. Each homestead instead tends to operate at the same level of pig production intensity, regardless of its consumers/worker ratio. If pig production among the Duna were truly production by and for the domestic unit, that is, according to the domestic mode of production, then it would have to be concluded that those homesteads with a higher ratio of consumers per worker enjoyed less pork consumption than those with fewer consumers/worker.

Either that or, an alternative possibility, production is not according to the DMP, but dominated instead by external mechanisms of It might be, for instance, that pork consumption is redistribution. equalised throughout the community, with mechanisms of redistribution transferring pigs from those homessteads with a production advantage to those which are handicapped by their adverse consumers/worker If consumption is equalised, so that its trend is the trend ratios. of the Chayanov slope, then the degree to which redistribution mechanisms operate is indicated by the displacement of the empirical slope from the Chayanov slope to either side of the point of mean composition and production (M). From the point of view of the community as composed of domestic units of sexually undifferentiated consumers and workers, the Duna mode of production would indeed be primitive communism: from each according to his ability (since the "workers" of this analysis are actually worker units, weighted according to an estimation of average work capacities), and to each according to his needs (since each consumer unit receives an equal share of the communal product regardless of the production capacity of the consumer's homestead).

However, as already explained, an analysis of this kind can in no way demonstrate the actual existence of mechanisms of redistribution. Only ethnographic enquiry can reveal whether consumption is equalised or not, and by what means. On that basis it indeed appears that consumption is equalised. Pig production is not production for domestic consumption but rather production for social exchange. Pigs are transferred from the domestic unit to the lineage by means of the piatsaiya ("helping") relationship, and then either further transferred to other lineages or individuals outside the lineage for redistribution, or redistributed within the lineage as a form of sacrifice. The principle in the distribution of pigs transferred outside the lineage is that individuals should receive pigs in respect of previous pigs invested, or in compensation for loss of life or property. The principle of redistribution within the lineage is that everyone should It thus seems, particularly in the latter case, receive equal shares. that redistribution mechanisms do equalise consumption.

But the theory that I have developed as appropriate to production among the Duna begins with the rejection of simple notions of primitive communism such as might be inferred from the empirical/ empiricist analysis so far. The theory begins instead with the intuitive formulation of a mode of production in which class-like relations obtain between bio-social categories, between men and Can the empirical data be manipulated to "prove" that men women. exploit women? The relevant data are the number of male and female worker units in each homestead and the corresponding pig production reported for each homestead. An empiricist theory would hold that the relationships between these three variables as empirically recorded represents the structure of the relations of production. This would be a structure abstracted from reality; no formulation of a theoretical object distinct from reality is required. Since different homesteads have different compositions of male and female labour, it should be possible by statistical manipulation to show the contributions of each to the production of pigs. Assuming that the pigs produced are indeed the joint property of men and women (that is, leaving aside questions of "secondary false appropriation" occuring outside the production process), the question of exploitation is then resolved into the question "which contributes more to the production of pigs, male labour or female labour?"

315.

Such an approach has a double attraction. It avoids the conceptual difficulties of thinking the epistemological break between reality and theory as the object of science, and, within the empiricist epistemology, it provides a direct route from available labour units to production, without intervening estimations of typical time and energy expenditures. Not that time and energy expenditures, adequately recorded in the field, could not also be made the subject of an empiricist theory; but rather, that by conceiving of the relations of production as a simple set of relationships between empirically measured variables of available labour and production output an alternative formulation of the problem of demonstrating exploitation becomes possible. The relationship between labour-inputs and production-outputs can be thought of as if mediated through a "black box" containing time and energy transformations. Without knowledge of the contents of this box, it is still possible to ask about relationships between inputs and outputs. The estimates of time and energy expenditure made above could all be wrong, but the mode of operation of the box could still be known in terms of its results, vouchsafed by empirical data. Without knowing how many hours of labour or how much energy is involved, we can still ask about the correlation of pig production with available male and female labour.

As an initial approach to this problem, consider figure 4 a& b, in which pig production for each homestead is plotted against male and female worker units in the homesteads. In each case the distribution of dots suggests some correlation between pig production and available workforce, more clearly in the case of male workforce than female workforce.

1 18 4.14

In the latter case the apparent correlation would be improved if the homesteads of Paua and Damuna were dropped from the sample. As it happens, there are reasons for supposing that in both these homesteads the available female labourforce was under-utilised by comparison with other homesteads. Paua was perhaps 75 years of age in 1970 and was unable to perform male garden work. The only other adult male in the homestead, Paua's son, was absent almost continually as a wage-labourer at Lake Kopiago. Homestead production depended upon areas of *Miscanthus* fallow in old abandoned gardens which the women of the homestead were able to clear for themselves, and upon a small bush garden being cleared by Paua's two younger sons, aged 12 and 7. Damuna, in the other case, was an able-bodied worker, but had no other men to help him in the preparation of garden sites for the four women workers of his homestead to mound. Perhaps this did not matter, since he was unable to extract full labour from the His wife had borne twins in the previous year, women in any event. and they had occupied much of her time until one of the pair died. The other women of the homestead were his sister and her daughters, the daughters being of an age where Damuna was having difficulties Similar circumstances of under-utilised female keeping them at home.



*u -

labour can be recognised as well in several other low-production homesteads, but these two cases are the most striking.

However, in estimating the contributions of male and female labour to production what matters is not so much the strength of the correlations (shown by the degree of dispersal of the dots) as the slope of their mean tendencies. If, for example, the trend of the plot of male workforce against production sloped upwards to the right more steeply than the trend for the female workforce, it might be concluded that worker unit for unit, men contribute more to pig production than do women. The slopes indicated represent the mean tendencies of the distributions at the intervals shown. In the case of the female workforce I have indicated two slopes, the upper slope excluding the two cases of Paua's and Damuna's homesteads. As it happens, visual examination suggests very similar slopes for both male and female labour, in each case an increase of about 1.5 pigs being realised for each increase of 1.0 worker units. Further reflection reveals the inadequacy in this initial approach. As the scatter-plot in figure 5 suggests, men worker units and women worker units are not independent variables. Although some homesteads have many more female workers than male, while others have more males than females, the mean tendency appears to be nearly unitary, with an average increase of one female worker for each increase in one male worker per homestead. The pig production slopes for each sex considered separately are thus necessarily the same; in fact, it is the same 1.5 pigs that are being looked after in each average homestead for each increase by one worker of either sex, since each worker increase of either sex is, on the average, accompanied by an To exploit the information increase of one worker of the opposite sex. available in the data, a more sophisticated analysis is required, a multiple regression analysis accounting for simultaneous variations in both-male and female workforce for each homestead in relation to pig production, together with an analysis of variance partitioning the variance in the data according to the variables analysed as independent of one another.



**

Figure 5. Men worker units per homestead and women worker units per homestead

-

10

Using an OMNITAB programme, in the first run of this problem I examined the relation between pig production in the 29 homesteads and five other variables pertaining to each homestead: men workers, women workers, consumer units, ha under cultivation and age of male head of homestead. (Computerised techniques of multiple regression analysis seem ideally suited to empiricist epistemologies, since they invite the investigator to "throw in" as many variables as he can muster data for, all information being grist for the computer mill - the assumption being that in real world situations the causes of any phenomenon are liable to be multiple.) The results of the first run were gratifying, with an estimated coefficient of linear correlation between pig production and the several variables of R = .80, implying that the variables taken together accounted for 64% of the variance in the data. However, the information contained in the variables of consumer units per homestead and age of male head of homestead contributed almost nothing in predicting the value of homestead pig On a second run of the programme these two variables production. were dropped, the resulting coefficient of correlation with the remaining variables dropping to only R = .79, accounting for 62.2% of the variance in the data. Thus, while the additional information provided by these variables in the cacciatori-empiricist approach of the first run contribute something to predicting the probable pig production of a homestead, their contribution is so small as to be of little worth, particularly when it is the relationship between pig production and male and female work units which is the focus of interest.

In the analysis of variance on the first run, the variable male workers accounted for 9.13% of the total variance, while the variable female workers accounted for 3.55% of the total. It therefore appeared that male workers contributed more (in the statistical, not the real world) to the prediction of pig production than did female workers. However, the analysis of variance is dependent on the order in which the variables are entered, unless they happen to lie upon orthogonal vectors. This follows from the inter-relations among the predictor variables, such that information about the number of male

workers necessarily conveys something about the probable accompanying number of female workers, and therefore accounts for some of the variance which would be accounted for by the number of female workers if that variable were entered first. Therefore, in the second run the order of the variables for male and female workers was reversed with female workers entered before male workers. The result was that 5.43% of the total variance in the data was accounted for by the variable female workers, while 7.31% of the variance was accounted for by male workers. Although the gap between the contributions of male and female workers was narrowed, it still appeared that men contributed more than women to pig production.

I then did two more runs, employing only the three variables of male and female worker units and ha under cultivation, with the variables for male and female workers alternately entered first to determine their respective contributions to the reduction of the total variance in the pig production data, now considering only 27 homesteads - not including those of Paua and Damuna. While empiricists ordinarily look askance at any tampering with the data such as this, in which two homesteads from the original sample are simply dropped on account of independent information suggesting reasons for their disproportionate contributions to the total variance, my reasoning was that such a procedure was permissible. Since I knew that these two homesteads in particular were unable to fully utilise their available female labour, and since I was interested in what male and female labour respectively contributed to pig production, it seemed that the problem would be clarified by an analysis that excluded instances where labour was known to be under-utilised. Retaining these two instances in the analysis gives a more accurate estimate of the role of average female labour as it is actually realised in the sample, but by dropping these cases the analysis approximates the contributions realised by male and female labour in combinations which Duna men would consider as normatively desirable. That is, in a male-dominated mode of production men try to arrange the composition of their labour-force so as to optimally utilise their male labour. Not all men succeed in this, but by restricting the

sample to those cases in which under-utilised female labour is not obvious, we arrive at a better understanding of the contributions of men and women to pig production as they tend to be realised in terms of the mode of production. (Of course there are also homesteads in which disproportional contributions to total variance are perhaps the results of either over- or under-utilisation of male labour, and these cases too could be dropped from the analysis. However, there seems little point in doing this, since men are here assumed to exercise dominance in the ultimate determination of the relations of production, and since, in any case, men can always do female garden work and do indeed do so in those homesteads with few women.)

A further point should be made clear at this stage. Men and women in Duna society think of themselves as independent labourers who freely choose their partners in entering into joint production, and this choice is in jural principle independent of considerations of kinship and residence. That is, e.g., a woman need not become a garden partner to her husband or to any other male in her homestead. She may, instead, enter into contractual agreements with other men at other homesteads to mound and harvest from their gardens. For this reason an accurate analysis of the relation between work input and production output should be based on knowledge of the actual garden partnerships of each member of each homestead, and each individual regardless of sex be regarded as the core of a separate production unit involving all that individual's garden partners. However, I lack the necessary information. On the other hand, I know that in the de facto situation homesteads tend to operate as production units, wives tend to work as garden partners to their husbands (as is reasonable if for no other reason than that the husband's gardens are closer to the wife's residence than other men's gardens), and although many women contribute part of their labour to homesteads other than their homestead of residence, the total female labour a homestead can command is nevertheless closely linked to the amount of female labour represented by its residents. I have therefore assumed that the dominant form of operation of the mode of production is the de facto rather than the de jure mode, such that the

male and female residents of each homestead can be considered as providing a reasonable estimate of the labour force and its composition for each homestead.

By dropping the two cases of Paua and Damuna, a gratifying increase in the coefficient of correlation was obtained, with R = .86and 74.6% of the total variance of the remaining data accounted for by the three variables of male and female workers and ha under cultivation. The estimated multivariate predictor for pig production in each of the remaining homesteads is y = 1.19 (female worker units available) + .877 (male worker units available) + 2.21 (ha under cultivation) - .66. (The values for pig production predicted by this equation could be plotted against the actual data on pig production for each homestead to demonstrate the effectiveness of the equation as a predictor).

In the analysis of variance on the third and fourth runs, the total variance in the sample was reduced from 592.67 to 584.02 by the elimination of data for Paua's and Damuna's homesteads. Of this total sum of the squares of deviations from the mean, 433.6 or 74.24% is accounted for by the sample mean itself taken as the first variable. On the third run the variable female workers was taken second and the variable male workers third. The resulting contributions to the reduction of the total variance were 13.33% and 3.28%, respectively. On the fourth run, with male workers taken before female workers, the respective contributions of the two variables were 8.32% and 8.30%. The contribution of information about ha under cultivation, taken as fourth variable in both runs, contributed 2.58% to reduction of the Finally, the unexplained residual of variance, the total variance. amount of variance in pig production that cannot be accounted for on the basis of information contained in the variables considered, amounts Thus, information on the three variables of to 6.55% of the total. male and female workforce and ha under cultivation, taken together with knowledge of mean pig production for the sample as a whole, provides a very good predictor of pig production by each homestead.

So far as the relative contributions of men and women to production are concerned, in the third run the variable of women workers (and the implied probability of accompanying men workers) accounted for four times the variance accounted for by the remaining information in the variable men workers, while in the fourth run with men workers taken before women, the variable of men workers (with its implied probability of accompanying women workers) accounted for no more of the total variance than did the remaining information in the variable of women workers. The implication is that, within the realm of statistics, the number of female worker-units as women resident in the homestead contributes more to the prediction of pig production than does the number of resident men as male worker-units. Depending on the order in which these variables are entered into the analysis of variance, if female labour is entered first it tells much more about pig production than does knowledge of available male labour, while if male labour is entered first the additional information provided by knowledge of available female labour tells as much again about pig production as does male labour.

An empiricist conclusion based on this empirical analysis would assume that predictor relationships (i.e. probability relationships of the kind that Glasse considered to constitute "the structure of society") imply actual, causal relationships in the real world. Since female workers contribute at least as much if not more than male workers to the reduction of variance in the data, it would be assumed that in the real world women contribute at least as much if not more than men to the production of each homestead's pigs. If the presence of women in a homestead contributes more (statistically now assumed equatable to really) to pig production than does the presence of men, then it can be assumed that average female labour (no matter what the hours, calories or efficiencies involved) contributes more to pig production than does average male labour. If average female labour contributes more to pig production, then 'women's share of the product should be more than men's share. The analysis suggests that women should "own" and therefore control the distribution and consumption of slightly more than one half of each

homestead pig. The difference between this share and the actual half-share allocated them by the jural rules of Duna joint production then becomes an amount of primary exploitation, an amount which women contribute to the production process but do not receive back in the form of ownership. The analysis thus suggests that, whatever the degree of secondary exploitation that may exist through male domination of the mechanisms of distribution/consumption in Duna society, a small degree of primary exploitation within the production process exists as well.

While this conclusion is perhaps not surprising in terms of the dominant position that Duna men observably have in the relations of production, it is nevertheless unwarranted. Predictor relationships based on empirical data analysis do not imply causal relationships. Some other variable or variables not even considered in the analysis may be causing the changes in both homestead composition and pig production which have appeared in the analysis to be in a mutual relation of probability. Discounting this possibility, the empirical analysis nevertheless suggests that women contribute as much or more to pig production than do men. Since I have excluded from the analysis those two homesteads in which it was certain that the women were not contributing as much as they could to production, while retaining in the analysis all other cases without regard to whether the men workers were known to be lazy rather than industrious, this conclusion seems highly likely. But even then, the analysis does not tell us how it has come about that women contribute more than men to total production. In a composite production process where both male and female labour must be combined to produce the final product,) it cannot be said that, e.g., women produce more pigs than men do. It can only be said that women's labour appears to weigh more heavily in But this may be either a matter determining the level of production. of women working longer hours than men, or a matter of a production bottle-neck, such that each homestead's pig production is determined by its available female labour - without female labour of itself contributing more than male labour in actual production.

In conclusion, analysis of homestead composition of workforce and associated pig production cannot substitute for the detailed consideration of time and energy expenditures in production so far as the problem of quantifiably demonstrating the exploitation of women is While the empiricist interpretation of the empirical concerned. analysis does suggest that women may be exploited within the production process, the time and energy analysis (as far as I have been able to carry it) demonstrates not that women contribute any more in total effort than do men, but only that they require more time to accomplish their part of the task. If the empirical analysis of homestead composition and pig production really does suggest the existence of primary exploitation within production, this finding is so far not accountable for within the time and energy analysis, nor is it a feature of the mode of production which I have elaborated as a concept That is, I have proposed a mode within the context of that analysis. of production in which men and women contribute equal effort to total production, so that the division of their joint product into two equal halves represents no exploitation. The only primary exploitation which the mode of production postulates as existing within the productive processes is the false appropriation of time, due to the greater intensity (and possibly productive efficiency) of male work-The empirical analysis suggests that there may possibly be effort. some primary exploitation of women within production not illustrated by the concept of the mode of production produced here. If this primary exploitation does exist, it should be noted that it runs counter to explicit Duna notions of fair and equal contributions to Therefore, we lack at present not only the methods joint production. of empirical analysis and more comprehensive data which would be necessary to conclusively demonstrate the existence of exploitation in this direct form, but we lack as well the theoretical concept by which such an exploitation could be understood.

/1/ Duna Country and the Duna People

¹The 1970-71 census books at Lake Kopiago Patrol Post/Sub-district Headquarters list 7,786 Duna speakers. These records are accurate enough, but do not include those Duna living on the Papuan side of the administrative boundary, who are censused together with Huli speakers in the Koroba sub-district. Various estimates suggest that there are anywhere from 9,000 to 17,000 Duna in all.

² "Duna" is of course a conventional Anglicised rendition. Enga speakers say "Nduna", Huli say "Tuna", and Duna themselves say "Yunua".

³See CSIRO, Lands of the Wabag-Tari Area.

⁴Rainfall data from Lake Kopiago station records, 1963-70. Brookfield and Brown (1963) propose a coefficient of seasonal variation, calculated as the standard deviation of monthly means divided by the mean of monthly means. Seasonal variation of rainfall is low at Kopiago, with a coefficient of .19. Compare: Wabag, .31; Mt Hagen, .27; Goroka, .53.

⁵Properly, only the *anga ane*, the "mother of nut-pandanus", are wild. They occur at very high elevations in the Müllers and seem to be self-propagating, although their prevalence may have been encouraged by human interference dating from paleolithic times. *Anga kone*, the "true nut-pandanus", occurs in the same altitudinal zone as the highest Duna gardens. Men plant and own them individually.

⁶A third Huguni' near Lake Kopiago has a like connection with Hugunda in the middle valley. Similar traditions link together other localities throughout Duna country and beyond.

⁷Hogbin and Wedgewood (1953) originally suggested this term for "the largest local group which can be regarded as having any political unity". Glasse (1968:23) uses the term for *de facto* Huli social groups (recruited from cognatic stocks) with interests in local territories. See also Jackson 1970. Despite the different emphases, somewhat the same entity is intended in both cases-a more or less coherent association of men and land. I use the term in a primarily territorial sense, as a delimited block of land associated with a maximal descent group or group-congeries. In point of fact, however, many Duna parishes contain territorial enclaves belonging to other descent groups.

⁸Elsewhere in the thesis I refer to *damene* simply as "lineages". Cf. Fox 1967:50, "Here I will use *clan* and *lineage* as the terms for higher and lower order descent-groups of whatever variety".

⁹Percentages are based on 200 word lists with 1% deducted for each 10 words short of 200 where full lists were not available. Duna list collected at Horailenda; Bogaia list at Yeru'; Ipili-Paiela list from New Guinea Lutheran Mission (n.d.); Bimin and Oksapmin from Healey 1964. ¹⁰ This surprises me, since Bimin—geographically the closest Ok language to Duna country—shows so few cognates by my comparisons. Linguists, however, are able to recognize cognates where an untrained analyst can find none. A close study of Bogaia, not mentioned in the studies referred to, might clarify the picture. There are perhaps 500 Bogaia speakers living along the southern fall of the Müllers, some near the Strickland and others behind Huli country. They are, apparently, the same people referred to as "Koi'iangi" by Clancy (1954) and Sinclair (1966). Their language has many obvious cognates with Duna despite a phonology much like Ok.

¹¹ The influence of the fringe Enga culture of the Ipili-Paiela is evident in the Logaiyu region of Duna country but negligible in the Tumbudu Valley. See Sinclair (1973) for illustrations of Duna, Huli and Ipili attire and accoutrement.

¹² Cf. Friedlaender 1975:117: "... the face seems to be the area most sensitive to population differentiation ..." Duna say that their neighbours differ from them in having "different kinds of noses, different faces".

and second a second

/2/ History, Transformation and Production

¹The manufacture of planilateral blades appears restricted to the Wahgi and Jimi Valleys. Elsewhere, including Duna country, lenticular blades continued in use until replaced by steel axes. Although planilateral blades replace lenticular blades over time at some sites, blades unearthed in the Wahgi Valley resemble recent planilateral forms from an early date (Allen 1970). See also Glasse 1969, White 1977, White and Modjeska 1977 and n.d.

²See also White and Thomas 1972 and White and Modjeska, in press, for some explorations of Duna ethno-archaeology.

³See section /5/.

THE RE CARLS

⁴Strathern (1971a:205) referring to Vicedom's description (Vicedom and Tischner 1943-48). As I do not read German I have relied upon Strathern and Allen 1967 for this account.

/3/ An Ethnographic Sequence in Central New Guinea

¹On the other hand, it may be that no distortion of historical memory is involved at all. See Velikovsky 1950.

²See Dye et al. 1968.

³See Appendix on age structure and population dynamics.

⁴My characterization of the Oksapmin people and their economy is based on observations while on a brief visit to Gaugutianmin, an area of dispersed settlement on the edge of the Strickland Groge opposite the Duna/Hewa parish of Yokona.

⁵Archaeological investigation of this rockshelter would probably reveal a great deal about the time-depth of human occupation in Duna country.

⁶The Oksapmin practice of tree-fallowing with casurina seedlings is unknown in Duna country.

⁷Straatmans (1967) has provided a demonstration of the reduction of wild food resources accompanying horticultural deflection of the natural forest environment. Increased reliance upon horticulture is self-perpetuating through the reduction of wild food resources which accompanies the process.

/4/ An Ipomoean Revolution?

¹"... Marx related to me, full of fire and enthusiasm, that for the last few days there had been exhibited in Regent Street the model of an electrical machine which pulled a railway train. 'Now the problem has been solved — the consequences are unpredictable. The economic revolution must be followed by a political one, for the latter is only the expression of the former'." (Liebknecht, Reminiscences of Karl Marx, p.27).

²In contrast, Okšapmin people told me they knew of tree barks and other plant substances both to encourage and prevent conception. Whether or not these methods have any effect, they were unknown to my Duna informants. More generally, I formed the impression that Oksapmin people made greater use of their natural environment's resources than the Duna—who often professed ignorance when questioned on local natural history. For the botanical pharmacopia of the Oksapmin and other non-Western Highlands (PNG) peoples, see Skingle 1970 and Schiefenhoevel 1971.

³Annette Hamilton (p.c.) notes that Duna marriage practices are in most respects the opposite of those observed in Arnhem Land, where the effect of male-imposed regulations maximizes female reproductive potential.

⁴Duna men say that the Huli and Oksapmin are "mere boys" when they marry. Before the period of missionary and administration influence, a man was considered old enough to marry "when he was really finished growing and had some grey hairs". ⁵On regional and temporal variation in sexual attitudes, the following comment by Bulmer (1968) on the Pinaye-speaking people of the Yuat Gorge (apparently low-altitude relatives of the Enga) is most intriguing:

One striking feature of community life was the relations between the married couples in the group. The two young married women quite openly lavished affection on their husbands, cuddling up to them to sleep during the siesta period, fondling them, delousing them, arranging their ornaments and dress, and so forth. I have only myself seen this kind of behaviour between the sexes in New Guinea once before, when we were first, in 1960, among the Karam of the Kaironk Valley, and I have never seen it there since." I have also seen it referred to in an ANGAU report on the Central Enga people at a very early stage of contact.

The prudery and avoidance of physical intimacy between men and women which is typical of the Central Enga (as well as of the Duna) today is well known from Meggitt's (1964) account. By contrast, Sinclair (1966: 214, 1973:96) observed that Ipili-Paiela (fringe Enga) women were "lighthearted and unafraid, showing none of the timidity and prudishness of the Duna and Huri [Huli] women". It seems that fringe populations are more likely to have relaxed relations between the sexes than central groups. Availability of game animals, lessened reliance upon domesticated pigs, and the consequent allocation of labour between the sexes may have much to do with this. Intensification of competitive exchanges in central areas following the suppression of warfare may also be a factor.

⁶Polgar 1975. Cf. Carneiro's (1961, 1970) distinction between coercive and voluntaristic theories.

⁷Duna traditions mention not only improved soil fertility but suggest as well possible instances of giganticism. Paliawi told me:

After the mö, everything will grow gigantically. Men will have big, strong children with lots of flesh. Nut pandanus and bananas will have big fruit. Sweet potato will be big. When this happened before there were two men born at Kuki who were very big. Their names were Kuki-Muya and Kumi-Himuya. Their bones are like the bones of dama auwape ("wild men", cannibal giants). The ancestors said that when the bones were like ashes, then the mö would be near to happening again. Muya and Himuya's bones were in a rockshelter at Kuki and at the time that the whiteman came their bones were indeed powdered. Everybody was expecting the mö, but the whiteman came in his aeroplane instead. Then we realised what the ancestors meant: waitsan, waitman em-yet inap pundaun ([white-]sand, the white man himself will land [in his airplane]).

Perhaps, if the tradition is not entirely fantasy, the presence of trace elements such as cobalt in the volcanic fall-out may have caused actual instances of giganticism? In any case, the conflation of ash-falls with the arrival of the white man suggests again the indigenous perception of the revoluntionary singularity of these events.

- "www.

⁸Whereas Clarke (1966, 1971:99) had previously reasoned that horticultural intensification was due to "an increasing population, but not a new crop", his more recent findings on the nature of taro cultivation have led him to propose "that the coming of the sweet potato could have had a mildly revolutionary effect on highland agriculture" (1973).

/6/ Dindi ("Ground")

¹The other academic referred to is Bill Clarke, whose visit to Horailenda while I was in the field set in motion more than one train of investigation.

²Not all Duna geography fits neatly into the cosmological model. Duna are well aware that the Naggia and other rivers at the headwaters of the Huli-Duna divide flow away from the Duna rivers in the opposite direction. The region from Koroba to Kelabo (the area of mixed Huli and Duna population) is often referred to as "the middle" or "the trunk", while the "roots" of Duna country are in Huli country and the "toptwigs" are beyond the Strickland. The association between the ground, men and the metaphor of the tree was nicely expressed in a Roschach inkblot interpretation by Dalipa of Aiyuguli (Adzugari):

It's a picture of the ground. Here is the base of the ground (*dindi tse*), in the Strickland. These are branches of men growing up from the base. On the other side [the opposite half of the ink-blot] is another ground-base, but it's up-valley, in Kui or Karukua [Huli or Enga country]. My ground, Aiyuguli, is in the middle.

³That these branches also have their own "bases" (unlike the branches of trees) is a difficulty with the metaphor not noted by Duna.

⁴Duna know that Huli country is even more cleared and densely populated than their own country. While they often express a sense of admiration for their more powerful and accomplished neighbours, Duna also recognize that such civilization brings with it certain unavoidable discontents. The lack of forest resources such as wild nuts and firewood, as well as the necessity for constant vigilance over land rights, are noted by those Duna familiar with Huli country.

⁵For a detailed treatment of the relationship between land categories and land rights in a Highlands society, see Pospisil 1965.

⁶In time the provisional rights of resident guests tend to become permanent. There are a few men in most parishes who think of themselves as members with full rights while admitting that they have we a no actual descent connections. "I'm staying here yao ("nothing", "for no reason", "without any basis")," they will explain. Mostly, these are the descendants of men who had in the past gardened and lived with a friend or kinsman who was a member of the parish by descent. ⁷In the upper Tumbudu Valley it seems that forest areas are demarcated into separate hunting and nut-harvesting grounds for each damene of the parish.

⁸Cf. Hides (1936:77-78) on the field system of the Huli: "As I looked on those green cultivated squares of such mathematical exactness, I thought of wheatfields, or the industrious areas of a colony of Chinese."

/7/ Anda ("Homestead")

¹Unlike myths (*hapiapo*), which are regarded as true stories, these folktales (*pikono*) are always works of imagination, usually relating the daring exploits of some warrior-hero. Irari compared them to cowboy movies. Some *pikono* are of near-epic proportions: "when an old man starts singing *pikono*, that's when I go home to sleep" remarked a youth. I am told that women tell *pikono* stories among themselves but do not sing them. Except for mourning laments and tuneless ditties sung while gardening or warking home in the rain, Duna women do not really sing at all. Cf. Chenoweth 1969.

²One Horailenda man built six houses adjacent to each other over a five year period. On any given night only two or three of the houses were occupied. "I like to build houses", he explained.

³In addition to the many other patterns of residence recognized by anthropologists (patri-virilocal, uxorilocal, avunculocal, etc.), perhaps we need to recognize a category of "porculocal" residence (Latin *porcus*, "hog")? The point to be appreciated is that Duna men do not recognize any single normative pattern of residence (apart from avoiding residence in their wife's parish unless they can trace their own descent connections there as well). In contrast with much anthropological ado about residential regularities, there is a decidedly aimless character in Duna practice. One person will suggest that another should come and live with him/her. The other will usually take up the suggestion, for no more reason than that there seems no reason why not.

"Cf. Perlman 1969, The Reproduction of Daily Life.

⁵Annette Hamilton (p.c.) notes early observations in Australia of women manufacturing flaked-stone implements. Perhaps the historical transition from hunting and gathering to horticulture in the Australasian region has been accompanied by a suppression of women's independent capacity to produce for themselves the direct instruments of production?

/8/ Mbou ("Garden")

¹Limited enquiries at Kelabo indicated that men in the upper valley clear most of their gardens from *yango*, although a number of new gardens had recently been cleared in the forest at the upper limits of cultivation.

²Menstruating women are strictly prohibited from entering all gardens. Men assert that anything a woman steps over at any time is polluted by invisible emissions: "We've seen men who've eaten sweet potato that some woman has stepped over, and they all got really sick and vomited." Accidental mis-steps while gardening are marked by women with sticks—to warn men against harvesting from these mounds. Although men say that women sometimes deliberately poison them with their menstrual blood, I have never heard of women deliberately stepping over garden mounds. My thanks to Rev. Brian Tulford of the Christian Missions in Many Lands mission at Arou for first pointing out to me the connection between mounding and pollution beliefs.

³The shape of Huli mounds seems suggested by the rectangular configuration of the wider garden, just as round Duna mounds are found within roughly circular perimeter fences. In the Aiyuguli area (upper Pori River), gardens of oblong and round mounds are interspersed, presumably the work of women with different ethnic backgrounds. No function can be assigned to the different shapes; rather, they suggest that women implicitly view *mondo* as miniature replicas of the garden-sites created by men.

'In searching for the functions of the sweet potato mound, Waddell seems not to have considered the ideological factor. As far as I know, the distribution of *mondo* techniques is restricted to the Duna, Huli and Enga peoples—thus coinciding exactly with the distribution of socalled bachelors' cults (*sandalu*, *sanggai*, *igity haroli*, *palena nane*) and with corresponding belief systems stressing the importance of male purity and the dangers of female pollution.

⁵The formulation of the *mondo* as a cognitive garden in miniature was first suggested to me by Bill Clarke. His exemplary procedures in investigating the nature of Duna *mondo* aided me greatly in my own subsequent observations, although I have not made use of the magical techniques of random sampling which he recommended!

⁶It is thus not the conditions of production which compel men to enter into relationships with others (either men or women) in Duna society. Cf. Levi-Strauss 1949:45-6.

Previously, a few pairs of cowrie shells (D. dange, "giri-giri", Cyprea species) would have taken the place of cash payments for labour.

⁸The homesteads in this sample have been selected from all parts of Horailenda territory and include units headed by "wealthy men", "ordinary men" and "nothing men", as well as units of differing workforce and consumer composition. However, the sample is neither random nor precisely stratified in relation to the total population of Horaile' homesteads (Table 13:1). My selection is biased towards those homesteads I was most familiar with. Worker units are estimated as follows: males and females under the apparent age of 11 years = 0 units; males between 1 and 13 = .5 unit, between 13 and 20 = .8 unit, between 20 and 55 = 1 unit, between 55 and 60 = .5 unit, and over 60 = 0 unit; females between 11 and 13 = .8 unit, between 13 and 60 = 1 unit, and over 60 = 0 unit. Consumer units are estimated as: males and females under the apparent age of 15 = .5 unit; males over 15 = 1 unit, and females over 15 = .7 unit. Total residents are those normally residing in the homestead, with fractional units for those individuals who normally alternate their residence between two or three homesteads. Pigs are calculated as standardized units on the basis of a composite statistic derived from three surveys - see section /9/. Hectare under cultivation, as explained below, represents the area of mondo visible in aerial photographs less 35.7% for mounds not in production. Since not all gardens are in the immediate vicinity of homesteads, and as I did not enquire fully into the whereabouts of other gardens utilized by the homestead groups, this is the least reliable part of my data. Eight homesteads in this sample are composite units headed by two or more men who share a women's house, clear gardens together, or otherwise combine their production and consumption activities. In Table 13:1, however, most of these composite units are counted as two or more separate homesteads, depending on the number of separate men's houses. In the last analysis it seems impossible to arrive at a single definition of the homestead satisfactory for all purposes.

⁹During 1972-73, red chillies were promoted as a potential cash crop. An immediate consequence of this attempt at economic development was a number of more or less serious accidents resulting from babies and small children eating quantities of dried pods.

¹⁰Apart from my tape and compass mapping of the gardens at Yuku, I have relied throughout this study on aerial photographs, series NG 98:2056-2062 and NG 102:1307-1315, taken by QASCO on 9/10/69 and 9/1/70 respectively. I am grateful to the Australian National University for covering the costs. With great patience Drusilla Modjeska produced a series of hand-drawn enlargements which were then checked against local features. Garden areas and distances are based on these maps. The original scale of NG 102 is between 1:10,908 and 1:11,014, based on photo distance:ground distance and focal length:flying height respectively.

¹¹ Simple magical spells (gao) were formerly used by those who knew them in the planting of bananas, pandanus and perhaps taro. Some informants suggested that the "half-Duna" peoples living along the Strickland might employ spells for sweet potato, but the only "magic" used by Duna proper was that of the *auwi*, i.e. the collective rituals performed by lineage and parish groups for the general renewal of the fertility of the soil.

¹²Ideally, one would wish for comparable data from the societies already considered in the thnographic sequence above (section /3/). In the absence of such data, the investigation of horticultural intensifiction must now proceed in the thesis on the basis of societies for which suitable data are available.

-1

¹³Since sweet potato requires between 4 and 12+ months to mature, depending on altitude (TPNG Bureau of Statistics, p.5), the chief difficulty in comparing reported yields lies in the significance of the length of the cultivation cycle. From the point of view of labour investment it makes little difference whether two or only one mound cycle can be completed within a year, so long as the yield weight for each cycle of the labour/production process is the same. But from the point of land requirements, it would appear that the 6 month cycle in the lower Tumbudu is capable of producing a lesser but comparable yield to the 12 month plus cycle at Wapenamanda, with half the amount of land under cultivation. On a daily basis, 1 ha of land in Duna country can produce 73.4 kg of sweet potato, while 1 ha of Raiapu Enga land produces only 52.0 kg per day. Since, in principle at least, a more compact farm is more efficient due to reduced labour in moving about the farm area and back and forth from gardens to homestead, the Duna cultivator would expend less effort even if he adopted the more laborious and intensive techniques of the Enga. In any case, for purposes of comparison the yield figures for shorter cycles can be extended on a yearly basis, but in doing so it is easy to lose sight of the fact that the yield per hectare no longer refers to the same area of land throughout the period. For example, were we to reckon that the yearly Duna production per ha was double the six month yield, that is 27.24 t/ha, we should also note that the hectare of land under cultivation during the first cycle would not for the most part be the same land under cultivation as in-the second cycle. Although the total area under cultivation at any time during the year would be one hectare, the actual plots in cultivation would be different (depending upon how long the cultivator leaves each harvested mound before breaking and remounding), so that more than an hectare of land would be required for one hectare's worth of yearly production.

¹⁴Production per person: see note /8/8, above. In each instance the total area under cultivation by the sample community in question is divided by total sample community population. Production per person is then estimated on the basis of area cultivated per person and estimated yield/area/unit of time.

/9/ Pigs and Sweet Potato Consumption

¹Results by this method are not likely to be as accurate as those obtained by Feacham (1973) through the use of local assistants, but they still seem reasonably reliable. While Feacham considers that Enga are liable to give gogus answers to direct questioning, Duna have considerably less to lose in answering honestly, since they are not so caught up in the competition and financial maneouvering associated with ceremonial exchange systems such as the *te*. I conducted two surveys, roughly a year and a half apart, and the answers obtained were not inconsistent. The first survey was conducted after I had already achieved some rapport with men at Horaile' and both the opinion of my field assistant (Irari) and the evidence of spotchecks at several homesteads confirmed the general impression of accuracy.

²That is, each standardized pig represents 60 kg weight of juvenile pigs.

³Duna, at least at Horailenda, go to considerable lengths to prevent their pigs from eating food scraps. Refuse from even casual snacks eaten while on the track will be placed in a forked branch or atop a tall tree stump. This is said to be a practice taught to Duna by Huli as a prophylactic against epidemic sickness (anthrax?)

⁴I have assumed that per capita consumption equals 80% of reported adult consumption, or 70% of reported adult male consumption.

⁵Pospisil's household included 51 adopted Kapauku youngsters who were not food producers. But in addition to their consumption, Pospisil also included in his household's purchase the surplus that he could not otherwise account for in his computations (1963a:395).

/10/ Labour and the Intensification of Production

¹My efforts in the field to find out about production processes seemed then to be of less importance than the recording of data on group composition, pig transactions, accounts of warfare, sorcery and witchcraft, mythology and the other tribal institutions which make up the stock-in-trade of social anthropology. I did not imagine then that Duna economic activity would become a focus for my interests and I was but slightly acquainted with works like Pospisil's monumental study of Kapauku economics. Rappaport's (1967) study was an attractive model at that time, as was Waddell's (1968) thesis on Enga agro-dynamics, but neither work reveals much of the social relations of production. The more convinced I later became of the necessity of grasping mechanisms of material production and demographic reproduction as a prelude to all other investigations, the more it became necessary to rely upon peripheral parts of my field data and interpolations based on other Thus does theory guide empirical research from the perspective sources. of hindsight.

²A Harege' man volunteered the information that Duna practices differed from those of the Tsinali, a people living beyond the Bogaia who are held to have ancestral connections with Hareganda. The Tsinali were said to plant their crops first and make fences later. Although the Duna of today know of the Tsinali only through tradition and not by any actual contact, this observation nevertheless seems correct see Schieffelin 1975.
³Pospisil 1963a:125. This estimate would appear to exclude time spent in walking to gardens and carrying the harvest back home again.

140

⁴However, Clarke (1971:176) suggests that Maring garden practices are not unlike the practices he observed among the Bomagai-Angoiang. Clarke estimates (p.173) only 825 hours of labour per acre of Bomagai-Angoiang garden per harvest cycle, a figure which does not give much confidence in the comparability of the Maring estimates. In all of the comparisons that I have made it must be recognized as well that sampling errors may exceed the actual differences between systems (Peter Krinks, p.c.).

⁵ Elsewhere (Pospisil 1963b:8), different and seemingly irreconcilable figures for Kapauku sweet potato yields are given. Pospisil may have converted his original (1963a:444) figures for yields in kilograms into English pound units which were then mistakenly reported as kilograms.

^bDuna cultivate .077 ha/person requiring 3224 hours/ha/cycle. This is equivalent to 248 hours/person/cycle. Since not every person in the population is a worker, a dependency ratio should be calculated from demographic data. However, as a rough estimate I here assume one adult worker for each dependent child or old person, so that hours per worker are double the hours per person estimated. With a harvest cycle of 185 days plus one month for initial preparation of site per cycle, a labour intensity of 2.3 hours per day per worker is suggested. This is horticultural labour alone and does not include time spent in directly tending pigs, building houses, manufacturing tools, cooking, caring for children and the sick, and so forth (see section /14/).

Kapauku cultivate .095 ha/person, comprising (for all crops) 81.2% under extensive shifting cultivation, 10.66% under intensive shifting cultivation, and 8.1% *bedamai*. There are then .077 ha requiring 2928 hours/ha (=226 hours/person), .010 ha requiring 1997 hours/ha (= 20.2 hours), and 008 ha requiring 3674 hours/ha (=28.25 hours). Total horticultural labour is then 274.5 hours/person/cycle. With a cycle of eight months including preparation time, a labour intensity of 2.27 hours per day per worker is suggested.

Raiapu cultivate .155 ha/person (subsistence crops only), comprising 70.4% open field cultivations and 29.6% mixed and kitchen gardens. There are then .109 ha/person requiring 4231 hours labour (= 461.2 hours/person), and 0.46 ha/person requiring 8083 hours (= 371.8 hours per person per cycle). The open field cycle is 55 weeks (= 1.20 hours/person/day), and the mixed garden cycle is 15 months (= 0.8 hour /person/day). Total horticultural labour is then 2 hours per person per day, or 4 hours per worker. (This compares with an average time of 21.4 hours/week/adult [3.1 hours/day] for subsistence food production as observed by Waddell (1972:table 21) in a survey of labour over 2615 man-days.) The 16 Maring of Tomegai clan cultivated an average of 1.60 ha in a two year period (Rappaport 1967:table 7), suggesting an area of .100 ha/person. Mixed sugarcane and sweet potato gardens require 5634 hours/ha/cycle; the ratio for mixed taro and yam gardens is about the same. This suggests 563.4 hours/person/ha/cycle, or 1126.8 hours per adult worker. The complete garden cycle is about 120 weeks, suggesting 1.34 hours/worker/day, but since Maring begin new gardens yearly their cycles overlap. Assuming a garden cycle of one year would seem to give a more accurate estimate of the actual work load, at 3.1 hours/worker/ day.

Calculations of labour intensity can also be made on the basis of consumption requirements, using data from Table 9:3 and p.154:

Duna consumption per capita and accompanying pigs is 5.0 kg/day. If 237 hours labour are required to produce 1 t of sweet potato, then this amount can be produced with 1.2 hours of labour. Assuming that the labour per each adult worker is twice this, a labour-intensity of 2.4 hours/worker/day is suggested.

Kapauku consumption per capita and pigs is 3.3 kg/person/day. If only 1% of all sweet potato is produced by the efficient intensive shifting cultivation system, on a proportional basis this would amount to .033 kg produced at the rate of 145 hours/t, or .005 hour. Likewise, 8.5% produced by *bedamai* cultivation would require .06 hour; and 90.5% produced by the inefficient extensive shifting cultivation system would require 1.07 hour. The total time required to produce the daily requirement would then be 1.14 hour per person or 2.3 hours per worker.

Raiapu consumption per capita and pigs is 7.6 kg/day. If 211 hours are required to produce 1 t sweet potato, this amount can be produced with 1.6 hours labour per person, or 3.2 hours/worker/day.

The Maring Tomegai clan of 16 people maintained 13 pigs, suggesting a daily consumption requirement of 4.6 kg/person. If 363 hours are required to produce one tonne of all crops combined, and sweet potato production efficiency is assumed to be the same, 4.6 kg could be produced with 1.7 hour of labour per person or 3.3 hours per worker.

⁷Pig cycles in which the larger part of the local herd is slaughtered or disposed of in periodic festivals or ceremonial exchanges have been widely reported in Highlands New Guinea. Examples include the Hagen moka cycle (Strathern 1971a), the Enga te (Bulmer 1960; Meggitt 1972, 1974), sequential festivals passing from clan to clan in the Asaro-Goroka region (Read 1954; Salisbury 1962), the Maring kaiko (Rappaport 1967), the Dani pig feast (Heider 1972) and the Kapauku pig feast (Pospisil 1963a). It may be that Duna auwi rituals with their accompanying mass pig slaughters constituted a pig cycle of long duration (ca. 12 to 16 years), but unlike the other cycles reported in the literature the Duna cycles were precipitated by sweet potato shortages and not consciously planned-for in advance.

⁸Friedman (1974:460) argues that comparison of the Maring with the Enga and Chimbu shows that "the size of pig herds is controlled by the exchange system of the groups involved. ... The size of pig herds is the result of political decisions (within limits), and it is probable that in less egalitarian societies the labour input is higher since the number of pigs raised per household is often double that of the Maring". while I am in agreement with Friedman that the connection between labour intensity and political economy (realized in exchange system) is of crucial importance, I think his polemical opposition to cultural ecology has blinded him to the full reality of the production process, which I see as depending upon both labour inputs (determined by relations of production) and the historical development of the forces of production (however, cf. Friedman's note 20). Labour inputs cannot be directly estimated from the size of pig herds and, on the evidence so far, there is no clear indication that the less egalitarian Raiapu work any harder than the Maring-except in the long-term, due to shorter intervals between pig cycles among the Enga.

⁹The concept of economic surplus, and hence of surplus production, is not at all straightforward-see for example Pearson 1957, Nicholls 1963, Wharton 1963, and Hindess and Hirst 1975:chapter 1. Surplus production in marxian economics is that portion of the total product in excess of the amount necessary to reproduce the workers, that is, the amount in excess of the subsistence needs of the worker and his/her family. However, subsistence needs are understood not as some absolute minimal ration necessary for survival, but rather as a customary and hence relative level of consumption. There is a tendency in New Guinean economies as much as in advanced production systems for the level of subsistence to rise with the increasing productivity of labour. The more pigs that people produce, the more they tend to consume-even when exchange systems dictate that one cannot consume one's own production. More, as the level of subsistence rises, there is a tendency for population to grow, thereby increasing the workforce and the total productive force of the society. But although the level of subsistence tends to rise in response to increased production, it is nevertheless the case that surplus production-surplus in relation to yesterday's customary level of subsistence-always exists as a concept. Without the concept of surplus production we cannot understand the rising level of subsistence or the tendency for populations to increase. My empirical concern here is with the mechanism(s) by which pig production (in terms of pig:human ratios) is increased. (And since increased pig production seems to be a key to increased human population, there is as well an indirect concern with the mechanism(s) by which societies themselves grow.) The mechanism for increasing pig production is, in effect, the mechanism for appropriating the surplus labour necessary for increased production, since all increases in production are surplus relative to yesterday's level of customary subsistence. Thus, while it is necessary to recognize that some level of pig production is always customary, it is also possible to think of pig production as the empirical realization of the appropriation of surplus-labour. In the final analysis it is possible to think of all pig production as surplus production.

¹⁰ Lest there be any confusion, I repeat that the estimates of Table 10:2 are for periods of peak pig production. By contrast, the estimates of labour-intensity per worker given above (p.156), refer to production levels as observed by ethnographers, whether maximum, minimum or somewhere in between the extremes.

¹¹ On the other hand, it seems that even the Raiapu can be considered a "meat-hungry" population (Waddell 1972:196, 200). Since adequate data on meat consumption are not available, it is open to speculation whether a high pig : person ratio necessarily entails a higher rate of meat consumption than at lower ratios where pigs may be killed more frequently.

/11/ Knowledge and Production

¹I asked Irari, Yopa and Paliawi of Horaile' to rank the men of the parish according to their *kono*. In practice, personal knowledge and wisdom is recognized in a man's ability to speak in public discussions. Accordingly, the men of Horaile' were ranked as "men with talk", "men with a little to say", and "men with nothing to say". These rankings can be tabulated against rankings related to production and social exchange. The relationship between personal *kono* and pig production as measured by the composite statistic tabulates as follows:

pig production per homestead

kono	0 to 3.4	3.5 to 6.8	6.9 or more	totals
"men with talk"	5	6	5	.16
"little to say"	3	9	·· 2	14
"no talk"	19	15	5	39
Totals	27	30	12	N = 69

Men with "nothing to say" or "no talk" are thus likely to be men who report having few pigs, while "men with talk" are more likely to report having many pigs than are men with less kono.

Pig production does not correlate entirely with reputation for participation in social exchanges. Some men seem to be always "helping others" while nevertheless reporting few pigs at their homestead. To some extent these men would seem to rely upon strategies of "finance" rather than production for the maintenance of their reputations (see Strathern 1969). Again, there are young men with large homestead herds who have yet to acquire a reputation as "men who are always helping". However, tabulating *kono* against reputation for contributing to the financial activities of kin and friends (both locally and outside the *damene* and parish) reveals a stronger association than between *kono* and production:

	reputation	reputation for "helping" (piatsaiya,				
kono	doesn't help	helps a little	helps every- where	totals		
"men with talk"	0	0	13	13		
"little to say"	2	9	12	23		
"no talk"	23	28	15	66		
Totals	25	37	40 N	= 102		

Men with a reputation for *kono* are all also men with a reputation for participation in social exchanges, although "men with nothing to say" often manage to "help everywhere" as well. Still, men with little *kono* are more likely than not to have correspondingly low reputations for exchange. Presumably a factor in this correlation is that reputation of one sort is being compared with reputation of a complementary variety, such that chance fluctuations in homestead pig herds from year to year (and their effect on exchange activities) are cancelled out.

/12/ Theoretical Introduction

¹All primitive societies: In contrast with the opening chapter of *Stone Age Economics*, Sahlins' discussion of the DMP brings about an implicit shift of focus from hunter/gatherer to horticultural and agricultural societies. Is it that domestic groups are much less clearly production and consumption units in the former?

²Terray's analysis is closely based upon the ethnography and previous analysis of the Guro by Meillassoux (1964). Terray notes at the outset that "it is to Claude Meillassoux ... that credit is due for going beyond projects and programs and trying to test the fruitfulness of [Marxist] principles in the field" (p.95). However, Meillassoux's study (which I have not consulted) seems not to have elaborated any conception of mode of production corresponding to my interest here.

³Strictly speaking, a lineage cannot contain domestic units since these are based on affinal rather than descent connections. However, the distinction between a lineage as a descent group and as a composite of domestic groups joined by descent relations seems of little importance to either Terray or the Guro. It is likewise of minor importance to the Duna and can for most purposes be ignored.

⁴Although all societies must produce a surplus above that required for the subsistence of the direct producers, in hunting/gathering societies the surplus is ephemeral, since it can be neither stored for future use nor planned for in advance. However, Annette Hamilton (p.c.), has observed that among tribes of the Australian Central Desert women are compelled to gather and grind grass seed for the production of (surplus) flour consumed in male rituals. In her view, the exploitation of women by men may be characteristic of many hunting/ gathering societies dating from late paleolithic times. If this is accepted, then all ethnographically-known primitive societies may be expected to show traces of class-like antagonisms and exploitation between the sexes, and there is no reason to suppose that any discrimination can be made on this basis.

⁵Hindess and Hirst do not, of course, suppose that one can deduce the sweet potato or the steam-engine from a knowledge of the prevailing mode of appropriation of surplus-labour. However, they do seem to think that the division and organization of labour can deduced from the mode of appropriation of surplus. Their procedure appears to conflate the division of labour with the forces of production as a whole, and their notion of "proving" the validity of a mode of production seems to rest on the acceptability of this conflation.

⁶The large Kapauku surplus by comparison with Mazulu is largely an effect of Sahlins' procedure of counting all sweet potato produced in excess of average human consumption as a surplus. While Sahlins' assumptions are non-Marxist, the results are the same as by my own procedure, in which pig production (and hence surplus sweet potato produced for pigs) is regarded as the empirical realization of a conceptual surplus (see note /10/9, above).

By socialization of the work load I mean what is implied in Marx's phrase "from each according to his ability": taking into account the intrinsic inequalities of work-ability due to age and so forth, a completely socialized work-load would be one in which all workers did the same amount of work regardless of the number of dependants within their domestic units. The empirical slope on the Chayanov plot would be flat at all worker/consumer household compositions. The Mazulu empirical profile, although not flat, approaches such a socialization of workloads, as indicated by the communal redistribution of the product implied in its intersection with the Chayanov slope.

⁷Aboriginal northern California is another area of "primitive capitalism" (see Erikson, 1943, 1950). Perhaps there is a tendency to discover "capitalism" wherever elaborated systems of "primitive money" are encountered? However, Godelier in his excellent study of Baruya (eastern New Guinea) "salt currency" has pointed out that the identification of primitive "monetary" economies with modern capitalist economies rests on a failure to recognize the double function of primitive "money" as both a medium of commodity exchange and an object of social exchange. As a form of currency, objects such as shells or bars of salt are exchanged for other commodities, while as objects of social exchange these same shells or salt are "... given or redistributed in the very process of social life, of kinship, production and power relations" (Godelier 1971:53). Godelier further insists on the distinction between capitalistic economies in which the aim of production is profit, and those primitive economies in which even where profit is possible the aim remains the satisfaction of social needs.

Although the distinction between commodity exchange and social exchange appears to be crucial, the distinction itself nevertheless raises more questions than it answers. What is the destination of social exchange in class-based and, particularly, capitalist societies? Is it not subsumed within commodity exchange, such that "the very process of social life" and "power relations" appear as relations of economic rationality? And if social exchange effects the realization of power relations in primitive societies, are these exchanges then not imbued with the same features of false appearance which determine the alienating operation of capitalist political economy? The question, not asked by Godelier, is why objects with use-value (and therefore able to enter into commodity exchanges) are chosen in some systems as simultaneously objects of social exchange. Without understanding the nexus between commodity exchange and social exchange it does not seem possible to understand the tendency in the ethnographic sequence towards the expansion of production for social exchanges, and thus the tendency of primitive economies-like capitalist economies seeking profits-to expand and intensify commodity production as well.

⁸Consider the remarks of a Hagen woman reported by M. Strathern (1972:137):

"We women want to rear pigs for eating. If the clan kill pigs together and we all get a share, that is good. But if our husband's ... partners come and pull our live pigs, then we are angry. We look after them. Men only think of shells and money ..., but women think they rear the animals to eat them later."

/13/ Production, Distribution and Consumption among the Duna

¹That is, at least within the traditional view which holds that domestic housework is not productive labour. The development of a (largely feminist) sociology of housework, although I am not able to explore it here, would seem to suggest further convergences between marxian studies of primitive and advanced social formations.

²Weiya, "fighting", is also the Duna word for "sharing". One might see this as an instance of Müller's semantic principle of the nondifferentiation of opposites in primitive languages.

³Institutionalized homosexuality is unknown among the Duna. I once asked Irari if he had heard of the practices of certain Sepik and Papuan peoples in this respect. He was astounded: "What! Can a man give birth to a child then?" Young men occassionally pick younger boys as friends, and they may hold hands and embrace, but the relation seems to go no further. I could discover no evidence for the existence of masturbation. Little boys are told that no one will give them pork if they touch their genitals, and adults believe that no further warning is necessary to eliminate "dirty" (their word) behaviour. On the other hand, Duna men often report dreaming of heterosexual intercourse, and beliefs and practices in relation to these dreams indicate that although they are sometimes embarassing they are nevertheless implicitly acceptable.

344.

"I knew of one man at Horailenda who had married his FBD, a "true-sister" by Duna reckoning. While marriage with anyone to whom a consanguineal connection can be traced is considered "tabooed by the ancestors", in the case of so close a relationship there is no one who can take action against the couple. Men whom I asked about this particular marriage added as well that "if he wants to marry his sister then he won't have any brother-in-law. It's his own affair".

⁵Unmarried men up to the age of around 35 years often say that their lack of pigs has prevented them from marrying, but as Yopa of Horaile' told me:- "any man who really wanted to marry would 'stealcopulate' with a woman and force his lineage brothers to help him with the pigs." Pre-marital as well as adulterous relations are equally "steal-copulation", since the right to intercourse has not been acquired through payment of bride-price. Since the sexuality of a woman is controlled by her lineage (in the persons of her male consanguineal kin), the consent of the lineage is required for intercourse to be legitimate. (There is, therefore, no direct equivalent in Duna of our notion of mape, in which the consent of the woman herself is at issue). Despite Yopa's remarks, a man who attempted to force a marriage by steal-copulation ran. some risks in the past. The woman's kinsmen would attempt to kill his pigs and beat him with their axes. The marriage would be acceptable only if the man's kin promptly readied a bride-price in support of the malefactor, or if it was obvious that the couple would not separate.

⁶Duna do not chop off children's finger joints to placate ghosts of the deceased (cf. Heider 1970 on the Dani). A few people may mutilate themselves out of sorrow, but I am uncertain on this point. Douglas Groenwald of the Lutheran Mission near Lake Kopiago told me that selfmutilation was common in that area as a response to frustrations between opposite-sex siblings, spouses and lovers. Perhaps there is an Enga influence involved in this difference between Kopiago Duna and Duna of the Tumbudu?

Men sometimes accuse their sisters of witchcraft, though they do so no more frequently than they accuse their mothers. It seems significant that men never accuse their wives of being witches, although they may accuse them of trying to poison them with menstrual blood. The notion of mystical attack seems to arise only where the ideology of kinship denies contradictory interests—no one denies that wives may have motives for wishing to kill their husbands.

. 5

⁷Courting parties have been discontinued in the years since contact. Some men say that the Administration "tabooed" them as a waste of time, while others suggested that the missions had forbade them "because they got the wrong idea and thought we were putting our fingers up women's vaginas and things like that". Although some anxiety was expressed "least we *baggarap* our souls", I nevertheless promoted a *yekianda* in celebration of the completion of my field house. I saw no impropriety; women mostly stayed in the background while the men sang to themselves. Later I was told not to try initiating other traditional activities which were now "taboo": "the government and missions have airplanes and you don't; no good if they're angry with us". ⁸I recorded 35 annulments experienced by men living at Horailenda. In interviews with men I was told in 22 cases that the woman had left first, while in 7 cases the men said the annulment was their wish.

⁹There are thus no payments or gifts made to matrilateral kin to incorporate a child into the lineage or nullify maternal influences (compare Meggitt 1957:43, Wagner 1967, Strathern 1971b).

¹⁰ "Own", "sold": my words, not those of the Duna. The demonstration of the notion that sexuality is a covert commodity lies precisely in Duna avoidance of all economic references in speaking of marriage and brideprice.

¹¹Pospisil (1963a:209) says that only Kapauku men have the right to own pigs. Godelier (n.d.) reports much the same of the Baruya. My initial impression in the field was that only Duna men owned pigs, since they seemed to control their distribution. But increasing familiarity with the principle that labour confers rights led me to the discovery that Duna men did indeed recognize women's de jure rights in pigs, de facto appearances notwithstanding. Unless Kapauku and Baruya pigs are supported by male labour, it might be that de facto situations have been mistaken for de jure principles; certainly it is my impression that both Kapauku and Baruya society are dominated by less developed relations of production than Duna society, that the men in these societies are less able to extract surplus labour from women by virtue of legal rights. The Baruya emphasis upon male initiation, especially, suggests that exploitation-if it exists-is more likely to be based on the division of males into elders and juniors, rather than the division of the entire population into males and females.

In contrast, the relations of production as reflected in rights of ownership seem to have developed even further among the Hagen people than among the Duna. Marilyn Strathern (1972) implies that women have some rights of ownership (pp.48-9) in pigs while at the same time she quotes Hagen women to the effect that "men own pigs and women look after them" (pp.136-38). It would seem that despite women's labour investment in Hagen pigs, the men have almost completely appropriated legal ownership to themselves.

¹²It is perhaps not entirely a coincidence that the unplanned-for religious pig festival/sacrifices of the Duna have a long periodicity resembling the unplanned-for crises of the capitalist business cyclesee Jevons 1878 and 1879.

/14/ Can Exploitation be Démonstrated?

¹I am aware that I have not allowed extra time on the women's side in respect of child-bearing and child-rearing activities, apart from the time involved in food-cultivation, preparation, etc. It might be reasoned since labour expended on children results not in "production" but rather societal "reproduction", that no further account need be taken of the problem here. But this is only to defer to some later analysis the ultimate questions of women's exploitation. It would be better to recognize the problem at the outset, but I do not yet see how to proceed. Perhaps it is sufficient to observe that looking after children in Duna society is not time-consuming in the way that it is in our society. Most births are spaced so that a woman has only one small child at a time to look after. Babies can always be taken to the work-place (the garden), and caring for them provides a sociable diversion from horticultural labour. Children from the age of four or five are largely able to look after themselves, either helping their mothers or playing with age-mates in the vicinity of the homestead.

²There is an empirical weakness in this argument, however. Women rarely maintain the entirety of a garden-site under productive mounding at any one time. If the brief fallow periods of from 2 to 6 months per mound are reduced within a garden, a man can have his women workers produce more sweet potato (and hence pigs) without corresponding efforts on his part to increase the area of the garden site. But there are limits beyond which such a strategy runs into difficulties. In the first instance, productivity itself probably drops as the fallow periods for mounds within a garden are reduced. If we suppose, as my informants suggested, that major pig sacrifices accompanying periodic auwi rituals were followed by a 6 to 12 month period of intensive male effort to establish new garden sites, then it may be that in subsequent years there was a tendency for men to work less while relying increasingly on the intensification of mounding within established sites. Declining yields might then be a factor in addition to rising pig production, triggering the next ritual cycle. Secondly, limits may be set by the conditions of domestic relations. Women know approximately how much labour their husbands invest in garden work, just as men are able to observe the work of their wives. It may be that women are able to recognize that declining yields to their labour are a consequence of their husbands' neglect of their part of the process as a whole. In any case, domestic relations probably become increasingly strained as the labour of pig production falls more and more upon the women.

³For what it may be worth, I here summarize estimates of the time and energy expenditures in the several systems of horticultural production considered previously. The estimates are derived by methods similar to those employed in the Duna example, based on the published sources cited already:

111

amplitude (ratio pigs/persons)		hours labour/ person/	sexual d labour	ivision of by time	sexual divison of labour by energy (as % of total		
	.1.	day	6 hrs/day	hrs/day	calori	es/day) J	
KAPAUKU			· · ·		1.4		
min.	0.2	1.17	1.29(55%)	1.06(45%)	67.5%	32.5%	
max.	1.0	1.64	1.79(")	1.48(")			
DUNA				-			
min.	0.5	1.98	2.14(54%)	1.82(46%)	67%	33%	
mean	1.0	1.19	.55(23%)	1.83(77%)	34%	66%	
max.	1.8	1.48	.65(22%)	2.32(78%)	32%	68%	
ENGA							
min.	1.0	1.06	.17(8%)	1.95(92%)	13%	87%	
max.	2.5	1.69	.27(")	3.11(")			
+ yams etc.	2.5	2.99	2.23(37%)	3.76(63%)	50%	50%	
MARING				* .	-	2	
min.	0.2	1.23	.66(27%)	1.80(73%)	38.5%	61.5%	
max.	0.8	1.67	.80(24%)	2.54(76%)	35%	65%	

TIME and ENERGY estimates for horticultural production (as if on the basis of Ipomoean production alone)

In the Kapauki example it appears that so far as direct horticultural labour is concerned, women expend considerably less energy than men in production, although the inequality is less marked on the basis of time. So far as I can determine from Psopisil's information, fluctuations in the pig cycle have little effect on the division of labour, chiefly because so much of the horticultural surplus necessary for increased pig production is met out of extensive shifting cultivations which In the Duna case I have based require more male than female work. estimations on the assumption that men clear many new gardens at the beginning of each cycle, but that expanded production beyond the midpoint of the cycle is based mostly on increased mounding of existing sites. Thus the hours of labour involved decrease as pig production increases, although women work an increasing percentage of the totalhours. The Enga and Maring systems, like the Kapauku, entail increasing work effort as the pig population increases, although in the Enga case this is related to continuous fixed cultivations which require a constant amount of male labour for maintenance.

The relative productivity and efficiencies of these systems can be presented graphically. Plotting pig production against total caloric input for direct horticultural production:



Pic cruce and input-output relations in Central New Guinea economies . (energy inputs for horticultural labour only)

Disregarding the sexual division of labour, the Maring and Kapauku systems appear very similar. At all levels of pig production (that is, from the low-point to the high-point of the pig cycle), the Kapauku expend slightly more energy than the Maring per pig, and their higher level of peak production is due to increased exertion alone. The Duna system, by contrast, is much less efficient than the Maring and Kapauku while at the low end of its pig cycle, but as successive harvest cycles follow one another in the same garden sites it becomes increasing (This may contribute to the unplanned-for and crisis-like efficient. approach of the cycle's peak.) Finally, the Enga system, if it were based on sweet potato cultivation alone, would be the most efficient at However, the inefficiency of Raiapu shifting cultivation all levels. yam gardens (at least as reported by Waddell) makes the system in its actual operation less efficient than the other systems, except perhaps during periods of peak production intensity.

Finally, to return to the division of labour, I have attempted to estimate the total time and energy contributions of men and women to all subsistence activities: TIME and ENERGY estimates for total subsistence activities at mean production levels

19	hours	TI	IME	ENE	RGY	
	person/ day	ð hrs/day	q hrs/day	8 cal/day	f cal/day	
KAPAUKU	2.20	2.43(55%)	1.97(45%)	67%	33%	
DUNA	3.17	2.78(44%)	3.56(56%)	49%	51%	
ENGA	3.79	3.11(41%)	4.46(59%)	53%	47%	
MARING	2.25	1.62(36%)	2.87 (64%)	47.5%	52.5%	

If the differences suggested by these estimates are real, then I would suggest that they are to be understood as consequences of different prevailing relations of production between the sexes. The Kapauku (although they operate a shifting cultivation system technically similar to that of the Maring) appear as the only society in which unequal quantities of energy are clearly extracted from men. The Duna, Enga and Maring systems, despite their differences of appearance, all share similar distributions of the work-load between the sexes. It seems likely to me that the actual distributions approach 50/50 in all three cases, and that the ideologie's which explain and justify the distribution of labour are also similar (and distinctly different from the unreported Kapauku ideology of productive relations). On the other hand, I suspect that there are probably real differences in the distribution of time expenditures between the sexes. The Maring appear as the most successful exploiters of women's time, although I suspect that the Enga actually exploit women more (to judge from what is reported of antagonistic relations between the sexes). Again, sampling and associated errors in estimating the labour requirements of Raiapu mixed/yam gardens may have distorted the appearance of the estimates.

/16/ The Lingeage, Coercive Force, and Compensation

¹The view of paleolithic economy and outline of transformations suggested here has derived from many discussions with Annette Hamilton.

²The *palena nane* ("bog-iris boys") or bachelors' cult of the Duna should not be confused with male initiation in my view, although its Enga homologue, the *sandalu* or *sanggai*, has been so considered by Allen 1967 and Strathern 1970. The *palena*, like the Huli *igity haroli*, is an entirely voluntary cult concerned with male physical growth and preparation for marriage. The Enga cult has taken on the appearance of an initiation by becoming obligatory for all boys, but this is related to its function in displaying clan military strength and solidarity. ³It rarely happens that a lineage fails to meet its financial obligations as a consequence of war. I heard of one case in which a man who had led his lineage into a fight in which there were many deaths fled to Huli country and never returned. To avoid paying compensation is, however, to be completely discredited as a political leader. It also sometimes happens that a lineage's territory is over-run and the lineage as a corporate group disbands and disperses, with different men finding refuge among different groups of kin. This seems to have been rare in the lower Tumbudu, though more frequent in the upper valleys. If the men of the group later re-occupy their former land, they are unlikely to be able to avoid outstanding payments of *damba* to allies in the neighbourhood. *Damba* payments are sometimes deferred from one generation to the next, so that the sons must pay for the wars of their fathers.

⁴Further evidence on Duna identification of themselves with their pigs: it is said that men sometimes hear their pigs talking with human voices in the night. This is an omen fortelling the death of the owner, who can only avert catastrophy by ridding himself of the pig.

⁵Despite the convention that *damba* payments cannot be avoided, as well as the practice of demanding *damba* in cases of women who suicide, it seems that war leaders often refuse to pay *damba* for women killed during warfare. They say, in effect, that women's deaths are their own fault for not fleeing the scene of hostilities. Moreover, women as wives are not the blood kin of one's allies but only the kin of *anoa yane*, "other men" whose support may be of little importance.

⁶While war initiators do not pay compensation for deaths to men of the opposing side, it is possible to demand and accept compensation for deaths attributed to sorcery, at least until open conflict breaks out. In part is seems that this is possible because of the contradictions inherent in the practice of sorcery: men accused of sorcery can always claim that it was not their sorcery but the sorcery of someone else, or that they had not actually performed the sorcery themselves but instead hired another sorcerer who had killed the wrong victim by mistake. Because (as Duna say) "who can see sorcery?", it is always possible to give and accept *damba* payments while disclaiming responsibility and thereby saving face.

/17/ Sacrifice, Ideology and Transformation

¹Likewise, although there are no firm rules about how many ropes of shells and other valuables may be included as "pigs" in a brideprice, Duna consider it bad form to substitute many such items for living, reproducing pigs. The availability of money from wage labour has exacerbated the problem, with young men now arguing that money should be preferred to pigs because "money does not need to be fed and won't get sick and die". ²See Aufenanger 1967 for further details. I have never seen these rituals—they have only been described to me. Pigs not killed for mortuary or similar distributions are nowadays killed and distributed "for no reason" at small, neighbourhood gatherings, or butchered and sold for money at Lake Kopiago or at local "business parties".

³I confess that I am unable to explain how it is that *auwi* appear out of the ground at precisely the place and usually the "time" expected. *Auwi* are also said capable of travelling from parish to parish in the event that their agnatic descendants desert them. "Maybe they go underground, or perhaps they roll along on top of the ground like a motorbike", suggested a Huli informant.

Literature Cited

[Dates of citation are in most instances the year of first publication, but in some cases the year of original authorship or presentation. Where a more recent edition appears in the bibliographic entry, page references in the text of the thesis are to this edition.]

A11	en	Tim
UTT	en,	OTH

1970 Prehistoric agricultural systems in the Waghi Valley - a further note. Mankind 7:177-187.

Allen, M.R.

1967 Male cults and secret initiations in Melanesia. Melbourne: Melbourne University Press.

Allen, W.L. and Richardson, J.B.

1971 The reconstruction of kinship from archaeological data: the concepts, the methods, the feasibility. American Antiquity 36:41-53.

Althusser, Louis -

1968 The object of <u>Capital</u>. In L. Althusser and E. Balibar, Reading Capital. Trans. Ben Brewster. London: NLB 1970.

1969 Ideology and ideological state apparatuses (Notes towards an investigation). In L. Althusser, Lenin and philosophy and other essays. Trans. Ben Brewster. New York: Monthly Review Press 1971.

Angel, J. Lawrence

1975 Paleoecology, paleodemography and health. In Population, ecology, and social evolution; S. Polgar (ed.). The Hague: Mouton.

Anonymous

1962 Through the Strickland Gorge. Australian Territories 2:12-19.

Appell, G.N.

1969 Social anthropological census for cognatic societies and its application among the Rungus of Northern Borneo. Bijdragen tot de Taal-,Land-en Volkenkunde 125:80-93.

Ardener, Edwin

1972 Belief and the problem of women. In The interpretation of ritual; J. La Fontaine(ed.). London: Tavistock.

Aufenanger, H. (S.V.D.)

1967 Aus dem Leben der Duna am Kapiago-See in Neu Guinea. Zeitschrift fur Ethnologie. 92:3-73. Austen, Leo A.

1923 Tedi River district of Papua. Geographical Journal 62:335-349. Barnes, J.A.

1962 African models in the New Guinea Highlands. Man 62:5-9. Barth, Fredrik

- 1975 Ritual and knowledge among the Baktaman of New Guinea. Oslo: Universitetsforlaget.
- 1971 Tribes and intertribal relations in the Fly headwaters. Oceania 41:171-191.

Berard, Fr., OFMCap.

1957 Notes and observations of Tege Pulu held at Munima, Oct. 1957. Typescript, Catholic Mission, Tari (P.N.G.).

Birdsell, J.B.

1968 Some predictions for the Pleistocene based on equilibrium systems among recent hunter-gatherers. In Man the hunter; R.B. Lee and I. De Vore (eds.). Chicago: Aldine.

Blong, R.J.

1975 The Krakatoa myth and the New Guinea highlands. Journal of the Polynesian Society 84:213-217.

Bohannan, Paul

- 1963 Social anthropology. New York: Holt Rinehart and Winston.
- Booth, P.B. and H.W. Taylor
 - n.d. An evaluation of genetic distance analysis of some New Guinea populations. Paper presented at Australian Institute of Aboriginal Studies Conference, Canberra 1974.
- Boserup, Ester
 - 1965 The conditions of agricultural growth: the economics of agrarian change under population pressure. London: Allen and Unwin.

Bowers, Nancy

- 1968 The ascending grasslands. Unpublished doctoral dissertation, Columbia University.
- 1971 Demographic problems in montane New Guinea. In Culture and population: a collection of current studies; S. Polgar (ed.). Carolina Population Center Monograph No. 9.

Brass, L.J.

1941 Stone age agriculture in New Guinea. Geographical Review 31:555-69.

British Museum, The

1966 New Guinea: The Sepik head-waters 1963-4. London: H.M.S.O.

- Bronson, Bennet
 - 1975 The earliest farming: demography as cause and consequence. In Population, ecology, and social evolution; S. Polgar (ed.). The Hague. Mouton.

Brookfield, H.C.

- 1961 The highland peoples of New Guinea, a study of distribution and localization. Geographical Journal 127:440-[cited by Watson 1963 as referring to traditions of ash falls in Mendi, Tari and Wabag].
- 1972 Intensification and disintensification in Pacific agriculture; a theoretical approach. Pacific Viewpoint 13:30-48.

Brookfield, H.C. and Brown, Paula

1963 Struggle for land: agriculture and group territories among the Chimbu of the New Guinea highlands. Melbourne: Oxford University Press.

Brookfield, H.C. and Hart, Doreen

- 1966 Rainfall in the tropical Southwest Pacific. Canberra: Australian National University Press.
- 1971 Melanesia: a geographical interpretation of an island world. London: Methuen.

Brookfield, H.C. and White, J.P.

- 1968 Revolution or evolution in the prehistory of the New Guinea highlands: a seminar report. Ethnology 7:43-52.
- Bühler, A.

1946/	Steingerate, S	Steinskulpture	n und Felszeic	hnungen	aus Melanesien
1949	und Polynesier	Anthropos	41/44:225-274;	577-606	L

- Bulmer, R.N.H.
 - 1960 Leadership and social structure among the Kyaka people of the Western Highlands District of New Guinea. Unpublished doctoral dissertation, Australian National University.
 - 1964 Edible seeds and prehistoric stone mortars in the highlands of East New Guinea. Man 64:147-150.
 - 1968 Notes on the Western Schraders and the Pinaye-speaking people of the Jimi (Yuat) Gorge, Roneo ms., Dept. of Anthropology and Sociology, University of Papua and New Guinea.
 - 1971 Traditional forms of family limitation in New Guinea. In Population growth and socio-economic change; M. Ward (ed.). New Guinea Research Bulletin No. 42. Port Moresby: New Guinea Research Unit.

Bulmer, R. and Bulmer, S.

- 1962 Figurines and other stones of power among the Kyaka of Central New Guinea. Journal of the Polynesian Society 71:192:208.
- Bulmer, Susan
 - 1966 Pig bone from two archaeological sites in the New Guinea highlands. Journal of the Polynesian Society 75:504-05.

Bulmer, S. and Bulmer, R.

1964

The prehistory of the Australian New Guinea highlands. American Anthropologist 66, 4, Part 2:39-76.

Calaby, J.H.

n.d. Biogeographical factors relevant to the Pleistocene movement of man in Australasia. Paper presented at Australian Institute of Aboriginal Studies Conference, Canberra 1974.

355.

Carneiro, R.L.

1961 Slash and burn agriculture among the Kuikuru and its implications for cultural development in the Amazon Basin. In The evolution of horticultural systems in native South America; J. Wilbert (ed.). Caracas: Sociedad de Ciencias Naturales La Salle.

1970 A theory of the origin of the state. Science 169:733-738.

Chappell, J.M.A.

1964 Stone mortars in the New Guinea highlands: a note on their manufacture and use. Man 64:146-47.

Chayanov, A.V.

1966 The theory of peasant economy. Homewood (Ill.): Richard Irwin \bigcirc for the American Economic Association.

Chenoweth, Vida

1969 An investigation of the singing styles of the Dunas. Oceania 39:218-230.

Childe, V. Gordon

1936 Man makes himself. London: Watts. 1951 Social evolution. London: Watts.

Clancy, D.J.

1954 Report [Tari-Strickland-Fly patrol]. Unpublished ms., Australasian Petroleum Company.

Clarke, W.C.

1966 From extensive to intensive shifting cultivation: a succession from New Guinea. Ethnology 5:347-359.

- 1969 The Bomagai-Angoiang of New Guinea: the world's most efficient farmers? Seminar paper, Dept. of Human Geography, Australian National University.
- 1971 Place and people: an ecology of a New Guinean community. Canberra: Australian National University Press.
- 1973 A change of subsistence staple in prehistoric New Guinea. Paper read at Third International Symposium on Tropical Root Crops, Ibadan.

Cochrane, D. and Cochrane, N.

[1966] Yunaya haga giniu 3 [Duna literacy primer]. Ukarumpa: Summer Institute of Linguistics.

26 t ..

Conklin	, H.C.
1963	The Oceanic-African hypothesis and the sweet potato. <u>In</u> Plants and the migration of Pacific peoples; J. Barrau (ed.). Honolulu: Bishop Museum Press.
Craig,	Ruth
1969	Marriage among the Telefolmin. <u>In Pigs</u> , pearlshells and women: Marriage in the New Guinea Highlands; R. Glasse and M.J. Meggitt (eds.). Englewood Cliffs (N.J.): Prentice-Hall.
CSIRO	
1965	Lands of the Wabag-Tari area, Papua-New Guinea. Land research series no. 15, Commonwealth Scientific and Industrial Research Organization. Melbourne.
Deevey	Edward S.
1968	Pleistocene family planning. <u>In</u> Man the Hunter; R.B. Lee and I. De Vore (eds.). Chicago: Aldine.
Doyle,	Sir Arthur Conan
1917	The adventure of the cardboard box. In A.C. Doyle, His last bow. New York: G.H. Doran Company.
Dupré,	Georges and Rey, P-P.
n.d.	Théorie de l'histoire des échanges, example de l'Ouest Congolais (Congo-Brazzaville). Unpublished ms. cited by E. Terray, Marxism and "primitive" societies, 1969.
Dye, W.	; Townsend, P. and Townsend, W.
1968	The Sepik Hill languages: a preliminary report. Oceania 39: 146-155.
Engels	. F.
1882 1884	Letter to Marx, December 8, 1882. In Marx, K. and Engels, F., Selected Correspondence 1846-1895. New York: International Publishers 1942. The origin of the family, private property and the state, in the light of the researches of Lewis H. Morgan. Fourth edition,
	TogI. Moscow: Foreign Danguages rubitshing house, ma.
1968	Capitalism, primitive and modern: some aspects of Tolai economic growth Camberra: Australian National University Press.
 Frikasy	Frik H
1943	Observations on the Yurok: childhood and world image. University of California Publications in American Archeology and Ethnology, vol 35 no. 10. Berkeley: University of California Press.
1950	Childhood and society. New York: Norton.
Evans-I	ritchard, E.E.
1939 1940	Nuer time reckoning. Africa 12: The Nuer: a description of the modes of livelihood and political institutions of a Nilotic people. Oxford: Clarendon Press.
	3

-

ŝ

64

Freacham, Richard

1973 The Raiapu Enga pig herd. Mankind 9:25-31.

Feyerabend, Paul

1975 Against method. London: NLB.

Finney, Ben R.

1973 Big-men and business: entrepreneurship and economic growth in the New Guinea highlands. Canberra: Australian National University Press.

Flenley, J.R.

1967 The present and former vegetation of the Wabag region of New Guinea: Unpublished doctoral dissertation, Australian National University.

Fox, Robin

1967 Kinship and marriage. Harmondsworth: Penguin.

- Freeman, Derek
 - 1970 Report on the Iban. (New edition of report first issued by Government Printing Office, Sarawak, 1955). London School of Economics Monographs on Social Anthropology No. 41. London: Athlone Press.

Friedlaender, J.S.

1975 Patterns of human variation: the demography, genetics, and phenetics of Bougainville Islanders. Cambridge (Mass.): Harvard University Press.

Friedman, Jonathan

1974 Marxism, structuralism and vulgar materialism. Man (n.s.) 9:444-469.

Gaisseau, Pierre

1956 Visa to the prehistoric world. Trans. C. Fitzgibbon. London: Muller.

Gardner, Robert

- 1963 Dead birds. A film produced by the Film Study Center, Peabody Museum, Harvard University.
- Geertz, Clifford
 - 1963 Agricultural involution: the process of ecological change in Indonesia. Berkeley: University of California Press.

Gellner, Ernest

1975 The Soviet and the savage. Current Anthropology 16:595-617.

Glasse, R.M.

1959	Revenge and redress	among the Huli. Mankind 5:273-79.	
1963	Bingi at Tari. The	Journal of the Polynesian Society	72:
	270-71.		

,

1

e * 1

1

. 44

Glasse, R	.M.
-----------	-----

4

e

1-5-

.

.

÷

1 5

31.

	1965	The Huli of the Southern Highlands. <u>In</u> Gods, ghosts and men in Melanesia; P. Lawrence and M.J. Meggitt (eds.). Melbourne: Oxford University Press
	1968	Huli of Papua: a cognatic descent system. Cahiers de l'Homme n.s. 8. Paris: Mouton
	1969	The quadrangular stone axe of the Huli, Southern Highlands of Papua. Anthropos 63/64:571-4.
	Godelie	r, Maurice
	1966	Rationality and irrationality in economics. Trans. Brian
0	1971	Pearce. New York: Monthly Review Press 1972. "Salt currency" and the circulation of commodities among the Baruya of New Guinea. Studies in Economic Anthropology, AS7:52-73.
	1975	Modes of production, kinship, and demographic structures. In Marxist analyses and social anthropology, A.S.A. Studies 2. London: Malaby Press.
	n.d.	Le sexe comme fondement ultime de l'ordre social et cosmique chez les Baruya de Nouvelle-Guinee: mythe et réalité.
	tore	Ms., Centre d'Etudes et de Recherches marxistes, Paris.
	Golson,	J.
	1976	Archaeology and agricultural history in the New Guinea highlands. In Problems in economic and social archaeology; G. de G. Sieveking, I. Longworth and K.E. Wilson (eds.). London: Duckworth
	1977	No room at the top: agricultural intensification in the New Cuinea highlands. In Sunda and Sahul: prehistoric studies; J. Allen, J. Golson and R. Jones (eds.). London: Academic Press.
	Golson,	J., Lampert, R., Wheeler, J. and Ambrose, W.
	1967	A note on carbon dates for horticulture in the New Guinea highlands. Journal of the Polynesian Society 76:369-71.
-	Gorman,	C.F.
	1970	Excavations at Spirit Cave, north Thailand: some interim interpretations. Asian Perspectives 13:79-108.
	Haddon,	A.C.
	1920	Migrations of cultures in British New Guinea.Journal of the Royal Anthropological Institute 50:237-280.
	Hallpik	e, C.R.
	1973	Functionalist interpretations of primitive warfare. Man (n.s.) 8:451-470.
	Hamilto	n, Annette
	n.d.	The forces of reproduction. Seminar paper, Dept. of Anthropology Macquarie University.
	Harris,	Marvin
	1971	Culture, man, and nature. Chapter 10, Ecology, demography and war. New York: Crowell.
1	* <u>-</u>	- 12

Hassan, Fekri, A.

Carpo ...

- ----

1975 Size, density, and growth rate of hunting-gathering populations. <u>In</u> Population, Ecology and Social Evolution; S. Polgar (ed.). The Hague: Mouton.

Hatanaka, S. and Bragge, L.W.

1973 Habitat, isolation and subsistence economy in the Central Range of New Guinea. Oceania 44:38-57.

Haxthausen, Baron August von

1856 The Russian empire, vol. 2. London.

Hayden, Brian

- 1972 Population control among hunter/gatherers. World Archaeology 4:205-221.
- Healey, Alan
 - 1964 The Ok language family in New Guinea. Unpublished doctoral dissertation, Australian National University.
- Heider, K.G.
 - 1967 Archaeological assumptions and ethnographical facts: a cautionary tale from New Guinea. Southwestern Journal of Anthropology 23:52-64.
 - 1970 The Dugum Dani. Chicago: Aldine.
 - 1972 The Grand Valley Dani pig feast: a ritual of passage and intensification. Oceania 42:169-197.
- Hides, Jack
 - 1936 Papuan wonderland. Sydney: Angus and Robertson, 1973.
 - 1939 Beyond the Kubea. Sydney: Angus and Robertson.
- Hindess, Barry and Hirst, Paul Q.
 - 1975 Pre-capitalist modes of production. London: Routledge and Kegan Paul.
- Hipsley, E. and Kirk, N.
 - 1965 Studies of dietary intake and the expenditure of energy by New Guineans. South Pacific Commission Technical Papers no. 147. Noumea: South Pacific Commission.

Hobhouse, L.T., Wheeler, G.C. and Ginsberg, M.

1915 The material culture and social institutions of the simpler peoples: an essay in correlation. London: Routledge and Kegan Paul 1965.

Hogbin, H. Ian

1951 Transformation scene: the changing culture of a New Guinea village. London: Routledge and Kegan Paul.

Hogbin, H.I. and Wedgwood, Camilla

1952/3 Local grouping in Melanesia. Oceania 23:241-76 and 24:58-76.

Holtker, Georg

1951 Die Steinvögel in Melanesien. In Südseestudien, Gedenkenschrift an Felix Speiser. Basel; Museum für Völkerkunde.

Hope, J.H. and Hope, G.S.

n.d. Palaeoenvironments for man in New Guinea. Paper presented at Australian Institute of Aboriginal Studies Conference, Canberra 1974.

Howard, M.C. and King, J.E.

1976 Introduction. In The economics of Marx: selected readings of exposition and criticism; M. Howard and J. King (eds.). Harmondsworth: Penguin.

Howlett, Diana

- 1962 A decade of change in the Goroka Valley, New Guinea: land use and development in the 1950's. Unpublished doctoral dissertation, Australian National University.
- 1967 A geography of Papua and New Guinea. Melbourne: Nelson.
- Hughes, Ian
 - 1973 Stone-age trade in the New Guinea inland: historical geography without history. In The Pacific in transition; H.C. Brookfield (ed.). London: Edward Arnold.
- Hutterer, Karl
 - 1976 An evolutionary approach to the Southeast Asian cultural sequence. Current Anthropology 17:221-242.
- Jackson, Graham
 - 1970 Review article: Glasse, the Huli, and descent. Journal of the Polynesian Society 79:119-132.

Jevons, William Stanley

1878 The periodicity of commercial crises and its physical explanation. Journal of the Statistical and Social Inquiry Society of Ireland 7:334-42.

1878/9 Commercial crises and sun-spots. Nature 19:33-7, 588-90.

Lafargue, Paul

1883 The right to be lazy. Trans. Charles Kerr. Chicago: Kerr and Company Co-operative, 1909.

Lampert, R.J.

1967 Horticulture in the New Guinea highlands -- Cl4 dating. Antiquity 41:307-9.

Langer, William L.

1963 Europe's initial population explosion. American Historical Review 69:1-17.

Lea, D.A.M.

1964 Abelam land and sustenance: swidden horticulture in an area of high population density, Maprik, New Guinea. Unpublished doctoral dissertation, Australian National University.

Lea, D.A.M. and Irwin, P.G.

1967 New Guinea: the territory and its people. Melbourne: Oxford University Press.

Leach, E.R.

1953 Cronus and Chronos. Explorations 1. <u>Reprinted in E.R. Leach,</u> Rethinking anthropology. London: Athlone Press 1961.
1961 Pul Eliya -- a village in Ceylon -- a study of land tenure and kinship. Cambridge: Cambridge University Press.

Lenski, Gerhard

1970 Human societies: a macrolevel introduction to sociology. New York: McGraw-Hill.

Levi-Strauss, C.

- 1949 Les structures élémentaires de la parenté. Paris: Mouton 1967.
- 1952 The concept of archaism in anthropology. <u>Trans. and republished</u> <u>in C. Lévi-Strauss</u>, Structural anthropology. New York: Basic Books 1963.
- 1955 Tristes tropiques. Trans. J. Russell. New York 1961.
- 1958 Postscript to chapter XV. <u>In</u> C. Lévi-Strauss, Structural anthropology. Trans. C. Jacobson and B.G.Schoepf. New York: Basic Books 1963.
- 1960 The scope of anthropology. Inaugural lecture, Chair of Social Anthropology, Collège de France. Trans. S. Ortner Paul and R.A. Paul. London: Cape 1967.
- 1962 The savage mind (La pensée sauvage). London: Weidenfeld and Nicolson 1966.

Liebknecht, Wilhelm

1896 Reminiscences of Karl Marx. <u>Reprinted in Reminiscences of Karl Marx by W. Liebknecht and P. Lafargue.</u> Sydney: Current Book Distributors, n.d.

Malinowski, Bronislaw

- 1922 Argonauts of the Western Pacific. London: Routledge and Kegan Paul.
- 1935 Coral gardens and their magic; 2 vols. London: Allen and Unwin.
- 1941 An anthropological analysis of war. American Journal of Sociology 46:521-50.

Marx, Karl

- 1844 Economic and philosophical manuscripts.
- 1856 Speech at the anniversary of the People's Paper. London, April 1856.
- 1859 Contribution to the critique of political economy.
- 1867 Das Kapital.
- 1875 Critique of the Gotha Programme.

Meggers, Betty,

1954 Environmental limitation on the development of culture. American Anthropologist 56:801-24. Meggitt, M.J.

1957 The Ipili of the Porgera valley. Oceania 28:31-55.
1958 Mae Enga time reckoning and calendar. Man 58, art. 87.
1959 The lineage system of the Mae Enga of New Guinea. Doctoral dissertation, Sydney University. Published under the same title, Edinburgh: Oliver and Boyd 1965.
1964 Male-female relationships in the highlands of Australian New Guinea. American Anthropologist 66;4, Part 2:204-224.
1965 The Mae Enga of the Western Highlands. <u>In</u> Gods, ghosts and men in Melanesia; P. Lawrence and M.J. Meggitt (eds.).

Melbourne: Oxford University Press.

1972 System and subsystem: the Te exchange cycle among the Mae Enga. Human Ecology 1:111-123.

1974 "Pigs are our hearts!" Oceania 44:165-203.

Meillassoux, Claude

1964 L'anthropologie économique des Gouro de Côte d'Ivoire. Paris.

Morgan, L.H.

1877 Ancient society. New York: Meridian Books 1963.

Mulvaney, D.J.

1975 The prehistory of Australia. Revised edition. Ringwood (Vic.): Penguin.

Murdock, G.P.

1959 Africa: its peoples and their culture history. New York: McGraw-Hill.

McElhanon, K.A. and Voorhoeve, C.L.

1970 The trans-New Guinea phylum: explorations in deep-level genetic relationships. Pacific Linguistics, Series B, No. 16.

MacLennan, R., Bradley, M. and Walsh, R.J.

1967 The blood group pattern at Oksapmin, Western Highlands, New Guinea. Archaeology and Physical Anthropology in Oceania 2:57-61.

Nadel, S.F.

1951 The foundations of social anthropology. London: Cohen and West.

Nelson, H.E.

1971 Disease, demography, and the evolution of social structure in highland New Guinea. Journal of the Polynesian Society 80:204-216.

[New Guinea Lutheran Mission]

n.d. Ipili-Paiyala glossary. Roneo ms.

Nicholls, W.H.

1963 Development in agrarian economies: the role of agricultural surplus, population pressures, and systems of land tenure. Journal of Political Economy 71:1-29.

100

2

and ref

× .

Nishiyama	a, I.	
1963	The origin of the sweet potato plant. In Plants and the migrations of Pacific peoples; J. Barrau (ed.). Honolulu: Bishop Museum Press.	
Parsons,	Talcott	1
1966	Societies: evolutionary and comparative perspectives. Englewood Cliffs (N.J.): Prentice-Hall.	
Pearson,	H.W.	,
1957	"The economy has no surplus". In Trade and market in the early empires; K. Polanyi, C. Arensburg and H. Pearson (eds.). Chicag Free Press.	/ jo:
Perlman,	Fredy	
1969	The reproduction of daily life. Detriot: Black and Red, 1972.	
Peterson	, Nicolas -	
1975	Hunter-gatherer territoriality: the perspective from Australia. American Anthropologist 77:	
Pirenne,	Henri	
1936	Economic and social history of medieval Europe. Trans. I. Cleg London: Routledge and Kegan Paul.	33.
Polgar,	Steven	-ter
1972 1975	Population history and population policies from an anthropologic perspective. Current Anthropology 13:203-211, 260-62. Population, evolution and theoretical paradigms. <u>In</u> Population ecology, and social evolution; S. Polgar (ed.). The Hague: Mouton.	ical
Pospisil	, Leopold	
1963a	Kapauku Papuan economy. Yale University Publications in Anthropology No. 67. New Haven: Dept. of Anthropology, Yale University.	4
1963b	The Kapauku Papuans of west New Guinea. New York: Holt, Rinehart and Winston.	ad
	land tenure. American Anthropologist 67; 4, Part 2:186-214.	
Pretty,	G.L.	÷.,
1964a	A stone figure of a crested cockatoo from Melanesia. Man 64: 183-4.	- 1 - F
1964b	Stone objects excavated in New Guinea. Man 64:117.	
1965	Two stone pestles from western Papua and their relationship to prehistoric pestles and mortars from New Guinea. Records of the South Australian Museum 15:119-130.	
2		

2.

·

Ţ

÷

1

alamatic di mona. N

145

1

Rappaport, R.A.

- 1967 Pigs for the ancestors: ritual in the ecology of a New Guinea people. New Haven: Yale University Press.
- 1971 Ritual, sanctity and cybernetics. American Anthropologist 73:59-76.

Read, K.E.

1954 Cultures of the central highlands, New Guinea. Southwestern Journal of Anthropology 10:1-43.

1965 The high valley. New York: Scribners.

Rieckmann, K.H.; Kooptzoff, Olga and Walsh, R.J.

1961 Blood group and haemoglobin values in the Telefolmin area, New Guinea. Oceania 31:296-304.

Riesenfeld, A.

1950 The megalithic culture of Melanesia. Leiden.

Robbins, R.G. and Pullen, R.

1965 Vegetation of the Wabag-Tari area. <u>In</u> Lands of the Wabag-Tari area, CSIRO.

Sahlins, Marshall

- 1961 The segmentary lineage: an organization of predatory expansion. American Anthropologist 63:322-45.
- 1963 Poor man, rich man, big man, chief: political types in Melanesia and Polynesia. Comparative Studies in Society and History 5: 285-303.
- 1971 The intensity of domestic production in primitive societies: social inflections on the Chayanov slope. In Studies in economic anthropology; G. Dalton (ed.). Washington: American Anthropological Association.
- 1972 Stone age economics. Chicago: Aldine-Atherton.

Salaman, Radcliffe, N.

1949 The history and social influence of the potato. Cambridge, the University Press.

Salisbury, R.F.

1962 From stone to steel. Melbourne: the University Press.

Schiefenhoevel, Wulf

1971 Aspects of the medical system of the Kaluli and Waragu languagegroup, Southern Highlands District. Mankind 8:141-5.

Schieffelin, E.L.

1975 Felling the trees on top of the crop. Oceania 46:25-39.

Schmitz, C.A.

1966 Steinerne Schalenmörser aus Zentral-Neuguinea. Baessler-Archiv: Beiträge zur Völkerkunde n.f. 14:1-60. Seligman, C.G. and Joyce, T.A.

- 1907 On prehistoric objects in British New Guinea. In Anthropological essays presented to Edward Burnett Tylor. Oxford: Clarendon Press. [resume in Seligman and Joyce 1907 "On some new types of pre
 - historic objects in British New Guinea". Man 7, No. 94.]

Shantzis, S.B. and Behrens III, W.W.

1973 Population control mechanisms in a primitive agricultural society. In Towards global equilibrium: collected papers; D.L. and D.H. Meadows (eds.). Wright-Allen.

Simpson, Colin

1962 Plumes and arrows: inside New Guinea. Sydney: Angus and Robertson. Sinclair, J.P.

- 1966 Behind the ranges: patrolling in New Guinea. Melbourne: the University Press.
- 1973 Wigmen of Papua. Milton (Q)., Ryde (NSW), Port Moresby, London, etc.: Jacaranda Press.

Skingle, D.C.

1970 Some medicinal herbs used by the natives of New Guinea. Mankind 7:223-5.

Solheim II, Wilhelm

1972 An earlier agricultural revolution. Scientific American 226:34-41.

- Speiser, Felix
 - 1946 Versuch einer Siedlungsgeschichte der Südsee. Denkschriften der schweizerischen Naturforschenden Gesellschaft 87, 1. Zürich.

Stanner, W.E.H.

1968 After the dreaming. Boyer Lectures. Sydney: Australian Broadcasting Commission.

Steadman, Lyle B.

- 1971 Neighbours and killers: residence and dominance among the Hewa of New Guinea. Unpublished doctoral dissertation, Australian National University.
- 1975 Cannibal witches in the Hewa. Oceania 46:114-121.

Steward, J.H.

- 1941 Determinism in primitive society. Scientific Monthly, pp.491-501.
- 1953 Evolution and process. In Anthropology today; A. Kroeber (ed.). Chicago: University of Chicago Press.

Straatmans, W.

1967 Ethnobotany of New Guinea in its ecological perspective. Journal d'agriculture tropicale et de botanique appliquée 14:1-20.

No. wit

fran at contro

Strathern, Andrew

1969	Finance and p	production:	two :	strategies	in	New	Guinea	highlands
	exchange syst	ems. Ocean	nia 40	0:42-67.				

- 1970 Male initiations in New Guinea highlands societies. Ethnology 9:373-379.
- 1971a The rope of moka: big-men and ceremonial exchange in Mount Hagen. Cambridge: the University Press.
- 1971b Wiru and Daribi matrilateral payments. Journal of the Polynesian Society 80:449-462.

Strathern, Marilyn

1972 Women in between: female roles in a male world: Mount Hagen, New Guinea. London: Seminar Press.

Strathern, A. and Strathern, M.

1968 Marsupials and magic: a study of spell symbolism among the Mbowamb. In Dialectic in practical religion; E.R. Leach (ed.). Cambridge Papers in Social Anthropology No. 5. Cambridge: the University Press.

1971 Self-decoration in Mount Hagen. London: Duckworth.

Terray, Emmanuel

1969 Marxism and "primitive" societies: two studies. Trans. M. Klopper. New York: Monthly Review Press 1972.

Townsend, Patricia

1971 New Guinea sago gatherers: a study of demography in relation to subsistence. Ecology of food and nutrition 1:19-24.

Townsend, W.H.

1969 Stone and steel tool use in a New Guinea society. Ethnology 8:199-205.

TPNG Bureau of Statistics

1967 Report on intensive agricultural surveys in the Wabag Sub-district, 1962-64. Unpublished ms. Konedobu.

[TPNG Dept. of Agriculture, Stocks and Fisheries?]

n.d. Survey of indigenous agriculture in the Mount Hagen area, 1961-62.(?) Ms. copy, original unlocated.

Tuzin, D.F.

- 1972 Yam symbolism in the Sepik: an interpretative account. Southwestern Journal of Anthropology 28:230-254.
- 1974 Social control and the tambaran in the Sepik. In Contention and dispute: aspects of law and social control in Melanesia; A.L. Epstein (ed.). Canberra: Australian National University Press.

Vayda, A.P.; Leeds, A. and Smith, D.B.

1961 The place of pigs in Melanesian subsistence. In Proceedings of the American Ethnological Society; Viola Garfield (ed.). Seattle: University of Washington Press.

Velikovsky, Immanuel

1950 Worlds in collision. London: Gollancz.

Venkatchalam, P.S.

1962 A study of the diet, nutrition and health of the people of the Chimbu area. Dept. of Public Health Monograph No. 4. Port Moresby.

Vicedom, G.F. and Tischner, H.

1943- Die Mbowamb; Die Kulture der Hagenberg-Stamme in ostlichen 1948 zentral-Neuginea; 3 vols. Hamburg: Cram, de Gruyter.

Waddell, Eric. W.

1968 The dynamics of a New Guinea highlands agricultural system. Doctoral dissertation, Australian National University.

1972 The mound builders: agricultural practices, environment and society in the central highlands of New Guinea. American Ethnological Society Monograph No. 53. Seattle: University of Washington Press.

- Wagner, Roy
 - 1967 The curse of Souw: principles of Daribi clan definition and alliance in New Guinea. Chicago: University of Chicago Press.
 - 1974 Are there social groups in the New Guinea highlands? In Frontiers in anthropology; M. Leaf (ed.). New York: Van Nostrand.

Walsh, R.J.; Murrell, T.G. and Bradley, M.A.

- 1966 A medical and blood group survey of the Lake Kopiago natives. Archaeology and Physical Anthropology in Oceania 1:57-63.
- Watson, James B.

1963 Krakatoa's echo? Journal of the Polynesia Society 72:152-55.

1965a The significance of a recent ecological change in the central highlands of New Guinea. Journal of the Polynesian Society 74:438-450.

1965b From hunting to horticulture in the New Guinea highlands. Ethnology 4:295-309.

Wedgewood, Camilla

1930 The nature and functions of secret societies. Oceania 1:129-145.

Wharton, C.R.

12

1963 The economic meaning of subsistence. Malayan Economic Review. 8:46-58.

Wheeler, Jocelyn M.

1970 The impact of man on the vegetation of the Mount Hagen region, New Guinea. Unpublished doctoral dissertation, Australian National University.

White, J. Peter

1967 Taim bilong bipo: investigations towards a prehistory of the Papua-New Guinea highlands. Unpublished doctoral dissertation, Australian National University.

368.

61 A 31 03

- 1972 Ol tumbuna: archaeological excavations in the eastern central highlands, Papua New Guinea. Terra Australis 2. Dept. of Prehistory, Research School of Pacific Studies, Australian National University.
- 1977 Axes and <u>aré</u>: stone tools of the Duna. Film available from the University of California Extension Media Centre, Berkeley.

White J.P. and Modjeska, N.

- 1977 Where do all the stone tools go? In The spatial organization of culture: I. Hodder (ed.). London: Duckworth.
- n.d. The life and death of some Duna axe blades. Paper to be presented at the 150th Anniversary Symposium in Anthropology, The Australian Museum, Sydney, August 1977.

White, J.P.; Modjeska, N. and Hipuya, Irari.

in press Group definitions and mental templates: an ethnographic experiment. In Stone tools as cultural markers—change, evolution, complexity; R.V.S. Wright (ed.). Canberra: Australian Institute of Aboriginal Studies.

White, J.P. and Thomas, D.H.

1972 What mean these stones? In Models in archaeology; D.L. Clarke (ed.). London: Methuen.

White, L.A.

1943 Energy and the evolution of culture. American Anthropologist 45:335-56.

Williams, F.E.

1930 Orokaiva society. Oxford: Clarendon Press.

1936 Papuans of the trans-Fly. Oxford: Clarendon Press.

Wirz, Paul

my tim the new

1951 Über die alten Steinmörser und die andere Steingaräte des nordöstlichen zentral-Neuginea und die heilige Steinschale der Minembi. In Südseestudien, Gedenkenschrift an Felix Speiser. Basel: Museum fur Völkerkunde.

Wurm, S.A.

- 1964 Australian New Guinea highlands languages and the distribution of their typological features. American Anthropologist 66;4, Part 2:77-97.
- 1970 Indigenous languages. In An atlas of Papua and New Guinea, R.G. Ward and D.A.M. Lea (eds.). Dept. of Geography, University of Papua and New Guinea.

Yen, D.E.

1963 Sweet potato variation and its relation to human migration in the Pacific. In Plants and the migrations of Pacific peoples; J. Barrau (ed.). Honolulu: Bishop Museum Press.