JEROME NAMIAS

1910 - 1997

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Introduction

Jerome Namias moved to Scripps Institution of Oceanography after a productive career at the U.S. Weather Bureau and led a new way of thinking about weather, climate, and long range forecasting. His work during his career straddled research and operational forecasting, and he personally studied many of the important weather phenomena that affected the Nation during the 20th century. The advancements he made at Scripps were central to developing concepts of coupled ocean/atmosphere/land phenomena, whereby features at the ocean and land surface provide a short period climate "memory" that helped to organize weather patterns on time scales of a few days to several months. He began visiting Scripps in 1968 and moved here in 1972 in pursuit of the thesis that the North Pacific Ocean was a key element in understanding and predicting downstream weather patterns over North America.

Favorite photo of Jerome Namias, La Jolla, 1978.

My introduction to Namias was at a Scripps department seminar when he spoke in Sumner Auditorium in March 1973. His topic was "Crazy Weather Patterns of 1972." Typical of the problems that attracted him, this case marked a swing in the seasonal weather, and he laid out evidence for what happened and argued persuasively about why it happened.

As his lecture unfolded we were treated to a collection of multimedia (atmosphere and ocean) puzzle pieces that he then proceeded to assemble—as a long range weather detective apparently making sense of causes and the evolution of a joint North Pacific Ocean/North American climate anomaly. In developing this plot, Namias drew upon his own deep history of unraveling weather mysteries on national and global scales.

His experience was pretty much unparalleled, beginning with the era of dust bowl droughts, "sweating out" forecasts made for Allied forces invading North African beaches in World War II, systematically examining the large scale physics of the Northern Hemisphere westerly wind "index cycle," and developing systems to forecast the weather at extended ranges, first 5 days in advance, then 30 days, then a season. He formed his case around a set of "charts," which were hand contoured and usually illustrated departures from a long term normal. Jerome had charisma, (although I later learned that he put a lot of preparation into his public image) his style came off as informal, and he conveyed a great sense of wonder and enjoyment in describing these climate puzzles. Added suspense was injected into the struggles that Jerome described because the evidence was invariably wrapped up in a forecast that had been or was being made. Later, when I was hired (1977) to work for Namias as a research associate, I watched him apply these tools in dealing with a string of climate problems.

In the course of his tenure (1941–1971) at the U.S. Weather Bureau (later the National Weather Service), Jerome Namias pushed his attention—and that of the meteorological community—to the structure of the mid-latitude atmosphere, extended weather fluctuations (his 5-day forecasting monograph was published in 1947), and short period climate variability (90-day forecasts were begun in 1958) (Namias 1964). Namias's work at Scripps marked a different phase, or as he said in his 1986 autobiography, his "second wind," following pioneering years at the Massachusetts Institute of Technology (MIT) and the National Weather Service (Namias 1986, Rasmusson 1998). As a measure of the unusual duration of Namias's accomplishments, realize that in 1938 the American Meteorological Society awarded him the first Meisenger Award for "application of thermodynamic tools to weather forecasting," and in 1981 it awarded him the Sverdrup Gold Medal for his air-sea interaction work.

Namias's life makes a rich American story. His father (a first generation immigrant who settled in Fall River, Massachusetts) became established as an optometrist. He wanted his sons to follow his professional lead. However, Jerome, the younger of two boys, was inspired by his Durfee High School physics teacher and became interested in meteorology and forecasting at an early age. In spite of being stricken with tuberculosis and finding difficulties in obtaining employment during the Great Depression, Jerome persevered. He secured a position charting data at the Smithsonian Institution and the U.S. Weather Bureau for H. H. Clayton, an established scientist who was seeking evidence for solar-weather influences. Through the journal collection in the Weather Bureau, Namias began to read about mainstream meteorological physics. From his readings and an amount of initiative uncommon from such an upstart, Namias managed to obtain a personal invitation to meet Carl Rossby at MIT Rossby turned out to be the single most important figure in modernizing American meteorology, or according to Namias, "the man of this [20th] century in meteorology." Of course at the time Namias didn't realize that he was diving into

an exciting revolution in meteorology, from a mostly empirical art that tried to explain surface weather to a physically based science that introduced appropriate theory and new observations to describe behavior, in four dimensions, of atmospheric weather systems. Evidently, Namias sufficiently impressed Rossby, and he took on Jerome as one of his understudies, and—as Namias acknowledges in his autobiography—was to become his mentor. Because of rather harsh economic circumstances and a series of illnesses, Namias's education was unorthodox; his undergraduate college experience was provided mostly by a series of correspondence courses, and the only college degree he held was a Master's Degree awarded by MIT in 1941, evidently under the strong influence of Rossby.

Despite his illnesses and a serious automobile accident in 1964, Namias was very well traveled. Virtually all of these trips related to weather and later climate work, his position at the U.S. Weather Bureau and later at Scripps took him to many gatherings throughout North America and abroad. He had a keen memory and fond habit of recalling names, locations, and people, usually scientific colleagues or dignitaries he encountered. Jerome's constant companion on his travels was his wife, Edith, who appeared to handle many of the logistics for these trips. Proudly displayed in Namias's office was a color depiction of a wave cyclone and its connection to long waves in the upper atmospheric flow. This was a sketch by Edith, an accomplished artist whom Jerome credited for recognizing the natural symmetry of weather patterns. After World War II, Jerome, Edith, and daughter Judy were invited to Stockholm by his mentor Carl Rossby, and later to several other European meteorological centers, where Jerome studied and gave lectures. Befitted with new hemispheric upper air data and his participation in the rapidly developing United States meteorological science culture, Namias was rather a meteorological celebrity. Namias and Edith obviously enjoyed such stature, and "voyages" such as this became a way of life with them.

By 1971 Namias had grown tired of government budget and organizational battles (Namias 1986), despite his prominence at the National Weather Service, where he had built up long range forecasting to a recognized operational routine. Both his mentor Carl Rossby and friend and supporter Harry Wexler[1] had passed away, and longtime collaborator Phil Clapp was retiring.[2] At Scripps, he found his second wind a highly productive era in which he was to experience the second scientific revolution during his working life, in this case the development of air-sea interactions and climate studies into the mainstream of the earth science arena.[3]

The Move to Scripps

Somewhat ironically, after his three-decade career at the extended forecast division of the National Weather Service, Namias landed at Scripps instead of an east coast institution. After all, he had roots in the east, had essentially begun his career at MIT, had followed and forecast weather over the eastern United States and the European sector, and on more than one occasion had spent time at Woods Hole Oceanographic Institution. Namias's preoccupation with ocean influences was sparked by the remarkable climatic anomaly of 1957-1958, a massive warming in the eastern Pacific accompanied by biological shifts. Key to his later move to Scripps was that this occurrence was brought into focus for him at a multidisciplinary CalCOFI conference, the "Rancho Santa Fe Meeting" held in

bucolic setting in 1960 (Sette and Isaacs 1960). The changes that occurred, which were tied to the strong 1957-1958 El Niño episode, were particularly intense in the coastal waters along the eastern boundary, notably the California coast. At the California Cooperative Oceanic Fisheries Investigations Rancho Santa Fe meeting, Namias led off by discussing background climate conditions for this episode. This meeting and the 1958 event catalyzed his impression that a major generator of weather over North America was the North Pacific, with its vast upstream seat and the ability to carry as much heat in its uppermost few meters as could the entire atmosphere. Characteristic of his intense interest in climate events, he visited the 1957-1958 episode at least twice in publications (Namias 1959, 1972), first studying mechanisms producing the remarkable ocean temperature features in the eastern North Pacific, and then broadening his scope to consider how the oceanic event fit into a slowly evolving atmospheric pattern across the Pacific Basin.

Moreover, at Scripps Namias had found an organization appreciative of his ideas (perhaps the Weather Bureau did not always share this enlightened attitude). Namias's imaginative treatment of large-scale natural phenomena had impressed John Isaacs, who directed the Scripps Marine Life Research Group and who had co-organized the Rancho Santa Fe meeting. Isaacs later hosted Namias in a series of extended sabbatical visits to Scripps, sweetened with a beach house nearby, ocean view, and a gardener. This pilgrimage began in 1968, and continued until 1972 when Jerome and Edith migrated full-time to Scripps after his formal retirement from the National Weather Service.

Climate studies were nonexistent at Scripps at that time, although noteworthy efforts had been conducted in earlier decades by longtime Scripps Professor G. McEwen (Shor 1978) and later by Scripps/UCLA graduate student Woodrow Jacobs. Namias, however, had the advantages of more atmospheric and oceanic data, an emerging computing capability, and a clear vision of how to apply them. Namias and climate studies were supported strongly by Director William Nierenberg, who saw values in large-scale studies and in applying them to societal problems. With the establishment of the NORPAX project,[4] climate variability studies took hold and the seeds were sown for the Scripps Climate Research Group. Namias served as head of this group until 1979 when Richard Somerville came on board.

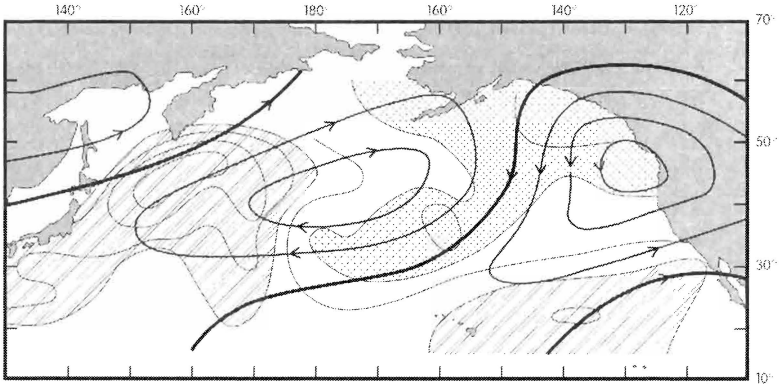
Ground Breaking Studies on Ocean-Atmosphere Interactions

At Scripps, with the assistance of John Isaacs and his staff, Namias settled into a situation that allowed him to pursue research topics of his choosing without being saddled with operational duties (although he soon fashioned an experimental seasonal forecasting routine that was essentially an operational regimen). Here, he pioneered basic studies describing how sea surface temperature (SST) patterns developed over the entire span of the North Pacific. These SST anomaly pools were usually commensurate with anomalous features in the atmospheric circulation.

North Pacific SST anomalies often persisted seasons to years in advance. Notably, Jerome found in SST anomalies an agent that might qualify as the long-sought-after influence upon long range weather fluctuations: great heat content, seasonal timescales, and a spatial dimension that could affect continental weather. Together with Scripps staff member Robert Born, Namias spent a great deal of effort in developing statistical and physical models associated with North Pacific SST, and how they related to atmospheric circulation. At the

same time, these anomaly fields were catalogued in a set of CalCOFI Atlases (Namias 1975b, 1979) as well as in a digital monthly data set that was widely distributed. Cross correlations relating atmospheric circulation anomalies at a given point to those elsewhere around the Northern Hemisphere were both a subject of investigation and a diagnostic and forecasting tool. These statistics were laid out in the 1981 atlas of seasonal teleconnections of 700-mb height, one of three Namias CalCOFI Atlases that he and others consulted frequently.

Even though he lived in the environment that saw the development of the theoretical and modeling underpinnings of meteorology, Namias was very much an empiricist who gained his understanding through actual weather charts or their statistics. In the early years at the weather service, synoptic data sets had become available, and observational meteorologists began to discover that there was order in the evolution of large scale weather systems, using the technique of averaging maps taken from several days or particular cases. In a noteworthy example (1976), Namias postulated that SST anomalies south of the Aleutian Islands and western Alaska provided a "negative feedback" to fall cyclones that developed in this region. Typically, he used a synoptician's insight (Namias and Clapp (1944) were impressed by strong cyclonogenesis in the Gulf of Alaska describing long waves in the westerlies), but Jerome now used seasonal aggregates and a 27-year data set to decipher this behavior. He reasoned that warm SST would destabilize cool air masses and increase latent and sensible heating, thus amplifying cyclones, while cool SST would have the opposite effect, i.e., stabilizing the lower boundary and minimizing cyclonic development.



The winter 1969 atmospheric circulation (isopleths of 700-mb height anomalies) and SST anomalies (light shading denotes warm; dark shading denotes cool) over the North Pacific. This case was the object of one of Namias's early air-sea interaction case studies: he chose it as the cover of his *Collected Works*.

Namias was not mechanically inclined. For example, he never acquired a driver's license (nor did Edith). In La Jolla, Namias relied on fellow scientists or one of his staff for transportation back and forth from his home on Coast Boulevard to his office. He did startle his colleagues and staff when he acquired an Apple™ personal computer in the 1980s. Mostly this was used to type manuscripts, (Namias was a prolific writer) but he also got it to muster simple computations and rudimentary graphics. This was quite a transition for Jerome, who had been accustomed to a large personal staff at the National Weather Service, a practice that he adopted when he migrated to Scripps. Here he always had a secretary, Carolyn Heintskill (Baxter) and later Mary Ray; an illustrator, Marguerette Shultz; one or two programmers, Robert Born and John Faust and later Emelia Bainto; and researchers Sam Stidd and later Dan Cayan.

Case Studies and Seasonal Forecasts

Several of the defining aspects of Jerome's career were instigated by anomalous seasonal weather events. Rasmusson (1998) notes that it was the great North American continental drought and dust bowl of the 1930s that "launched him on his life's work: long range forecasting." William Nierenberg, director during Namias's Scripps tenure, often remarked about the forecast that Namias made for the United States during the 1974 OPEC Oil Embargo as helping to persuade the Nixon Administration not to mandate fuel rationing i.e., because of his prediction of mild temperatures over the eastern United States that winter (as it turned out, this was a relatively successful forecast). The dust bowl and several other events are topics that he studied through his working career (see Namias 1975, 1983, 1992) *Collected Works*. Among them during the Scripps era were Winter 1977, which delivered the remarkable western drought and eastern U.S. cold outbreaks; Summers 1980 and 1982, which featured large mid-continental droughts; and 1982-1983, which was arguably the greatest El Niño observed by instrumental records. Part and parcel of Jerome's research on these episodes were his interactions with the media and with public officials in articulating the *what/how/why/when* of them, although he endured grousing about this from peers, who sometimes saw this as showboating. Interestingly, in retrospect, Namias's media interaction is probably a useful model for the type of authority that N.O.A.A. is seeking in its current efforts to design a National Climate Service. He clearly recognized the need for scientists to interface with decision makers.

On the occasion of wandering into Jerome's office, you would find yourself on a Namias-guided travelogue through his latest weather fascination. Invariably this was conducted against a backdrop of "how" the climate system arrived at this state, and "where" he thought it was headed. The evidence would be pinned to his wall, in the form of weather maps. He had a keen memory for past weather patterns and a great appreciation for "the aesthetics of weather maps." Furthermore, it was his conviction that reasons for weather events must be found, not simply descriptions or statistical links. A favorite Namias case study (Namias 1978) invoked SST anomalies along with other "multiple causes" to elucidate effects leading to the extraordinary strong and persistent Northern Hemisphere circulation and weather during winter 1976-1977. With this diagnosis was presented the prescription for his seasonal forecast of this case, together with a validation that demonstrated his unusually high skill. About the same time, Namias's work with the NORPAX project was attracting center stage attention. One specific interaction that Namias was fond of recalling was with Russ Davis who tested and to a limited extent, verified[5] Namias's hypothesis that mid-latitude SST anomalies provide a predictive measure for subsequent atmospheric circulations.

Inevitably, the diagnostic exercises that Namias conducted were aimed at forecasting. Shortly after arriving at Scripps, he reestablished seasonal forecasting, tailored similarly to the one he had developed at the National Weather Service but now in the spirit of experimental forecasting. With him, most weather and climate anomalies were viewed with an eye toward the next forecast and also how consistent they were with the previous one. Notable from his work and that of Tim Barnett was the establishment in 1980 of the first Experimental Climate Forecast Center at the Climate Research Group under the National Climate Act.[6]

The forecasting effort at Scripps displayed a two-pronged odd couple: the subjective and often bold forecast exercise of Namias, in contrast to the objectively based analogue effort of Barnett. Namias disliked analogue techniques because he felt they diminished the physical intuition provided by a human forecaster. However, the Barnett analogue technique was received positively by the Weather Service, that adopted it for its seasonal forecast procedures. In some cases, Namias's empirical forecast methods, accompanied by hand-waving attempts to rationalize why they succeeded or failed, provoked criticism or at least good natured ribbing from his colleagues, as is clear from E. Rasmusson's 1998 tribute to Namias. Nevertheless, as emphasized by Don Gilman and Huug van den Dool (successors to Namias as Heads of the Extended Range Forecasting at the National Weather Service)[7] Namias's ability to assemble and maintain an extended range forecast program at the National Weather Service was remarkable. So too was his influence later during his Scripps era, which (as emphasized by John Roads in his memoir of Namias's work) was vital in building interest in climate prediction at Scripps and in the broader climate community. From Jerome's work emerged a set of published diagnostic studies that had begun in his early days at MIT and the National Weather Service—a chronicle of many of the extraordinary climatic anomalies of the 1930s through the 1980s, with an eye toward physical linkages and extended range prediction.

The sequences of maps covering the walls of his second floor office in Sverdrup Hall were a Namias 'travelogue' of circulation, SSTs, and North American temperature and precipitation. The charts were the foundation of the most recent seasonal forecast, and often contained the essence of his latest ideas. The landscape in Namias's Sverdrup Hall (and later Nierenberg Hall) office did not change much from the National Weather Service Map Room (see Figures 1 and 2 of Rasmusson (1998)).

A Focus on Extratropical Oceans

Knowing what we do today, it seems surprising that Namias was a skeptic about the impact of the tropical ocean and atmosphere e.g., El Niño, on global climate variability. As E. Rasmusson (1998) describes, Namias was a mid-latitude synoptician who was practiced in identifying and observing vigorous systems that evidently were born and developed over the extratropics. It must be remembered that Namias was a central figure in describing the impressive variability expressed by wavering motions of the jet stream. As much as anyone,

he managed to interpret North American weather in terms of characteristics of the Northern Hemispheric air currents, as the "index cycle" expanded and contracted. In his view, such systems might as easily provoke tropical responses as they would arise from tropical influences.

Namias did participate modestly in the El Niño chapter, though, with a concise correlative study that provided statistically clear links relating the strength of the winter Aleutian Low to both the warm and the cool states El Niño-Southern Oscillation (ENSO). In retrospect, the notion that mid-latitudes of SST anomalies have a significant impact on Northern Hemisphere weather has had a revival, with recent diagnostics and modeling studies addressing multi-year variations in the Pacific Basin. Interestingly, Jerome was a fervent admirer and had developed a close friendship with J. Bjerknes during the period after Namias came to Scripps and in the early phases of NORPAX. But while Bjerknes had acquired a modicum of tropical ocean and atmospheric data, most of Namias's charts were void of data south of 15° or 20°N.

Along the way, Namias's attention was extended toward other topics,[8] including even longer period climate fluctuations. He was one of the first to consider interdecadal epochs. In collaboration with Robert Dickson (Lowestoft, United Kingdom) decadal climate regimes over North America were linked to winter storm tracks and climate anomalies over the North Atlantic. This paper (and several others subsequently) placed seasonal events in the longer period context of climate regimes. Also, with a view that often considered very broad scales, he along with Art Douglas was one of the pioneers in revealing that the North Pacific temperature has undergone multidecadal swings since the late 1940s. This idea has since been amplified in a series of studies elucidating the Pacific Decadal Oscillation, also known as the North Pacific Oscillation.

Dean of Climate

Jerome Namias's six decade participation in the forefront of the American weather/climate scene made him a unique link between the modern climate community and its forerunners. He was often an outspoken live wire at climate meetings. As pointed out by E. Rasmusson in his 1998 tribute, Namias provided memory and acted as a healthy skeptic toward automated forecast methods, and was always an advocate for physical understanding and the value of human experience and intuition. He made important historical statements in the *Bulletin of the American Meteorological Society* (Namias 1983b) and in a WMO interview (Namias 1988); both found in his *Collected Works*. An autobiography and some very interesting summary statements by his colleagues are found in papers from the Namias Symposium held at Scripps on 22 October 1985 (J. Roads, editor). Jerome was an inspiration to many in the climate community, particularly to a number of younger researchers including myself. He was a wonderful communicator, with an unusual ability to engage an audience, whether it was a formal address at a university lecture hall or in a one-on-one navigation across the rows of charts pinned to his office walls. Over the years, on the firing line at the weather service and through his many academic contributions, he was considered as—and enjoyed the stature of—unofficial dean of the community of climate forecasters and diagnosticians.[9]

Acknowledgments

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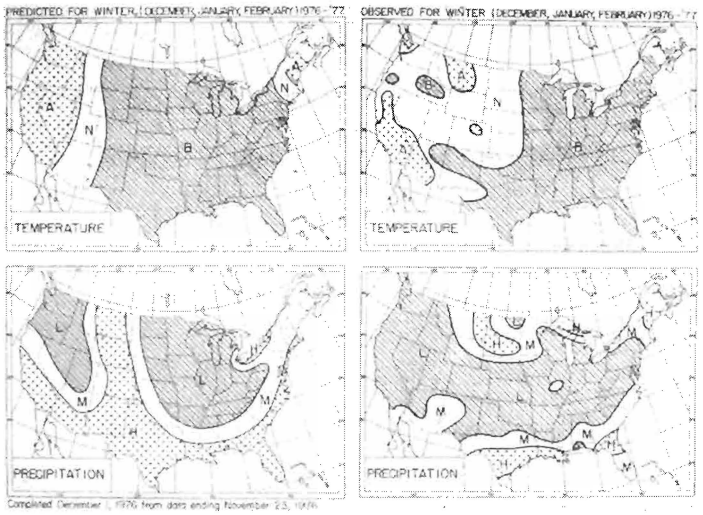

Seasonal forecast of U.S. temperature and precipitation for winter 1976–77 and precipitation and temperature observed.

Conversations with Don Gilman, Eugene Rasmusson, Huug van den Dool, Art Douglas, Chip Cox, Walter Munk, Caroline Isaacs, and Carolyn Baxter were important. Talks by Gilman, van den Dool, and Robert Haney at the Twentieth Climate Diagnostics Workshop (Berkeley, CA, November 1997) provided insight.

Footnotes

1. Namias and Wexler both attended Durfee High School in Fall River, Massachusetts. Namias was first to catch the weather bug—inspired by his high school physics teacher. Wexler (Namias [1968] describes him as "more scholarly") studied mathematics at Harvard, but Namias introduced Wexler to Rossby, who converted him to meteorological studies. Wexler went on to become chief of research at the U.S. Weather Bureau. Wexler and Namias married sisters, Hannah (Wexler) and Edith (Namias).

2. Clapp and Namias shared a retirement party from the National Weather Service in 1971. Phil Clapp also passed away in 1997, within weeks of Namias's death.

3. Interestingly, Namias's Collected Works (1975, 1983, 1992) contain 73 papers published during his first phase before leaving the Weather Bureau and 72 papers published during the Scripps Era.

4. NORPAX was an outgrowth of the Scripps "North Pacific Study" led by J. Isaacs. NORPAX was a multi institutional effort, dominated by physical oceanographers and funded by the Office of Naval Research and the National Science Foundation. The purpose

was to better understand air-sea interactions primarily in the North Pacific, with ultimate aim of improving long range weather forecasts over the ocean and around the globe (*Bulletin of the American Meteorological Society* 1974, 251-252). The NORPAX project involved both Namias, the advocate for mid-latitude SST effects, and J. Bjerknes, who elucidated key elements of global ENSO phenomena.

5. Davis's first paper, published in 1976, in considering lead/lag relationships between North Pacific SST and sea level pressure (SLP) for all months pooled together, found significant connection for SLP leading SST and for contemporaneous SLP and SST but not for SST leading SLP. However, the results of Davis's second paper, published in 1978, were more optimistic when these data were seasonally stratified, a significant connection linking summer SST with fall SLP, and fall SST with winter SLP was detected.

6. The Scripps ECFC still exists, but has evolved into the Experimental Climate Prediction Center (ECPC), now headed by John Roads.

7. Gilman became head of the long range prediction group at the National Weather Service in 1972 after Namias retired. Van den Dool succeeded Gilman in 1989. Both spoke about Namias at the Namias Memorial Session at the 22nd Climate Diagnostics Workshop in Berkeley in October 1997.

8. Namias did not shy from unpopular topics or untested ideas. During the last few years of his working career, he became convinced that weather patterns, via unusual surface pressure gradients or wind torques, could trigger earthquakes. He published two papers on this topic associating Southern California earthquakes and was working on further evidence.

9. Namias was awarded the Sverdrup Gold Medal for his air-sea interaction work in 1981. The distinction that he was most proud of was his election to the National Academy of Sciences in 1983. A comprehensive list of Namias's many awards and society memberships is provided in John Roads's 1998 memoir.

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