

Lend-lease From Norway

The Physics majors at U.C.L.A. were fond of "Big Joe", as he was called behind his back. There was an air of boyishness about him when playing in the annual faculty-student softball game. Yet Dr. Joseph Kaplan could be formal and imposing when discussing a thesis or a research project. He had been the popular Chairman of the Physics Department since 1936, when he was 34. The pipe clenched between his teeth was everpresent, even when he was sliding into third base. A notice on the bulletin board announced a special meeting of the department. It was September, 1940, exactly one year after World War II began in Europe. At the meeting he presented two newly-appointed professors who had recently joined the department. They would be offering courses in Physics of the Atmosphere.

The newcomers were Norwegian meteorologists, in their early forties. Jacob Bjerknes was tall, raw-boned, with a shock of brown hair. He moved slowly and deliberately and spoke the same way. His brief talk dealt with the potential impact of weather prediction on our lives. He explained how scientific weather forecasting had its beginning in Norway, with roots in Mathematics and Physics. We were intrigued by his courtly manner and his ideas.

Bjerknes's companion was Jorgen Holmboe, slender, intense, a chain smoker. Holmboe had a heavy Norwegian accent, which wasn't easy to understand. He obviously thought in Norwegian. Then he had to translate to English. There were many "umms" between each sentence as the translation took place in his mind. When speaking he frequently used an over-sized slide rule, which was pock-marked by dozens of cigarette burns.

Both men had been out of their country when the Nazis occupied Norway in April, 1940. They wished to settle in the United States but couldn't decide where. As highly regarded researchers and teachers they had received several offers from leading universities. Both had been approached by the University of California. At Berkeley they could have become part of the Geology Department. When Kaplan had learned of their plight he offered them appointments in his Department of Physics. They accepted.

In his introductory remarks to the assembled Physics students, Dr. Kaplan graphically described his perception of the war in Europe. He was convinced that the United States would become involved in the fight against Hitler. In addition he predicted our getting into war with Japan. We would have to mobilize for war. As part of that we would have to develop an Air Corps of 50,000 planes! Where did he get that idea? Most of us were taken aback with his predictions. He went on. An Air Corps that large would require many hundreds of meteorologists to serve as weather officers. Without weathermen the planes couldn't be flown safely. Where would these individuals be trained? Existing programs were inadequate. He pointed to the Norwegians. Here, he said, would be the nucleus to build a strong department. A faculty would be built around them. Where

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would the students come from? He looked at us. The significance of his message to the students was clear.

Five years before that talk Hermann Goering had had similar thoughts of manpower to those expressed by Kaplan. In charge of building a large, secret air force, Goering had sent Luftwaffe personnel to Norway for Meteorology training. He had recognized the great importance of weather forecasting capability. By coincidence Bjerknes and Holmboe had been among the teachers of the Nazi weathermen.

Kaplan had already acted on his convictions. He had met with General "Hap" Arnold, Chief of the Army Air Corps, who shared his views. A program was established where Air Corps cadets would come to U.C.L.A. for a eight-month training in Meteorology. A requirement for the students was a degree in Math or Physics. At the end of the course they would be commissioned second lieutenant weather officers. Plans would include enrolling candidates in the Navy as well.

Class I began the following month and consisted of eight cadets, a Naval Ensign, and two civilians. Dr. Bjerknes added to the core faculty by appointing Morris Neiburger, who had been at M.I.T. The fledgling department functioned well.

Class II began in June, 1941, with 50 cadets, 2 Ensigns and several civilians. One of the civilians was a brilliant graduate student in the U.C.L.A. Math department, Jule Charney. Upon his graduation, Charney became an important member of the faculty.

That summer Dr. Kaplan arranged a meeting for the Physics students which introduced a third Norwegian scientist, Harald Sverdrup. Most of us didn't know him. Sverdrup was described as the foremost Oceanographer in the world. The National Academy of Science had just recently awarded him the prestigious Agassiz medal. He was Director of the Scripps Institution of Oceanography in La Jolla, California, a branch of the University of California.

Professor Sverdrup cordially greeted his Norwegian friends on the stage. He was short in stature, with broad shoulders. Well-muscled, he gave the impression of energy as he bounded up the stairs to the podium. There was a twinkle in his eye as he confided to us that in the harsh northern winters he would have preferred to have a head of hair like Jacob Bjerknes' rather than his own bald hairstyle. When he spoke it was to emphasize vividly how study of the oceans could be vital to a Navy in war time. The influence of the oceans on weather patterns was enormous. His talk made most of us wish to sign up for his courses then and there.

A few months later Pearl Harbor proved Kaplan to be correct. Throughout the country many training programs were created by the military. Patriotic fervor was intense as enlistments in the services skyrocketed. In February, 1942, I was a senior undergraduate at U.C.L.A. and enrolled as a civilian in Class III of meteorology. Without a degree in advance I wasn't eligible to be a cadet. There were 100 cadets, 4 Navy

Ensigns and five other civilians in the class. I naively thought that with Dr. Kaplan's influence, I could be given a commission in the Air Corps after completing the course. The course credits fulfilled requirements for my degree.

The need for weather officers was so great that Class IV was begun several months before our class graduated. There were about 100 more cadets on campus, overlapping our courses. It was clearly a strain on the existing faculty and created serious problems of finding space for lectures and laboratory.

General Arnold came to the campus the end of October 1942 to hand out commissions when our class graduated. Many of the new lieutenants were assigned to posts in England, joining the Eighth Air Corps. I was envious and wanted to join the fight against Hitler. Several weeks before graduation, Dr. Kaplan notified me I should not expect to be commissioned. He had other plans for me. The next group, Class V, numbered 200 cadets and would begin their studies the following week. He needed instructors so badly that I would have to become a member of his civilian faculty. I was stunned and angry, having expected to be joining the Air Corps. Moreover, I felt foolish, after saying good-byes to relatives, friends, even selling my car.

Dr. Kaplan was unruffled and justified his decision. Finally I agreed to become an instructor, having no good option at the moment. I was younger than any of the incoming students, but soon was able to adapt to the role of teaching. My assignments were to lecture on Synoptic Meteorology and Climatology and to oversee the forecasting classes, which were held every afternoon.

The months went by quickly. In June, 1943, Class V graduated. The next class would begin almost immediately and numbered 300 cadets. Dr. Kaplan still obstructed my commission in the Air Corps. Most of my friends were in uniform, and I chaffed at being a civilian. The Navy had a Meteorology division, and I enlisted on impulse in the Navy. I learned it was necessary to become a Naval officer before becoming a Naval weather officer. That hurdle could be jumped by attending midshipman school, but my commission would be a Deck officer. To solve that problem I sought aid from Dr. Bjerknes, while I was in Midshipman school. He wrote a letter on my behalf to the head of Naval Meteorology, Captain Howard "Shorty" Orville. As a result, when I graduated, my commission was that of weather officer. Finally!

In the summer of 1944, I was transferred on special assignment to study with Dr. Sverdrup at Scripps. I was on detached duty from the Naval Air Station, San Diego, on a per diem pay arrangement. The purpose was to take a new course, the forecasting of Swell and Surf conditions. It was an extraordinary experience, lasting about ten weeks. The very concept of the course was exciting. American casualties at the recent invasions of Sicily and Tarawa would have been far fewer if the surf conditions had been anticipated. The surf was unusually high at Sicily, and many soldiers drowned. The reverse was true at Tarawa, where the waves and surf were unusually low, exposing the coral reefs more than had been expected. Our Marines were held up at the reef and

suffered heavy casualties. A year before, Sverdrup had developed a mathematical method of predicting surf conditions. It took time before the military brass recognized the potential value of his efforts. Early in 1944 a few Air Corps and Naval weather officers had taken a first course. This training gave a special qualification. I could be one of a small group available to consult in planning details of future invasions!

Twenty-nine year old Walter Munk was a co-worker of Dr. Sverdrup's in the development of the course. He taught a number of the sessions. Munk was introduced to Oceanography on his first visit to Scripps after graduating from Cal Tech in 1939. He soon joined the faculty and became indispensable to Dr. Sverdrup. Numerous research projects were developed, all highly classified. Many concerned submarine warfare. Frequently he and I went swimming in the ocean next to the Scripps pier. The water was often rough and always cold. Nothing daunted Walter, who was enthusiastic in all pursuits. I was too embarrassed to beg off when he suggested taking a dip one particularly cold and windy day. We were caught in a strong rip tide and were being swept out to sea. It was frightening, but Walter thought it had been a lot of fun after we finally struggled to shore.

Two other junior officers were present that summer at Scripps. Lieutenants Cleve Burke and Robert Arthur aided in the instruction of the classes.

On a number of occasions I was invited to the Director's home in the evening. Professor Sverdrup was a marvelous story teller. There were accounts of the Amundsen expeditions to the North Pole, from 1918 to 1925, when Sverdrup was the young scientific director. He told fascinating stories of living with Siberian eskimoes for seven months. One evening, on his birthday, we all had a few Schnapps. Dr. Sverdrup announced it was time for his annual ritual. What was it? Over the strenuous warnings of his wife, he proceeded to do a perfect hand-stand on the arms of his dining chair! It was very impressive.

While I was at Scripps, on September 1, 1944, the invasion of Pelelieu was in the planning stages. The depth of the waters off-shore was unknown. One of my predecessors at Scripps was flown over the beaches in a slow observation plane at 500 feet. The Japanese were so startled that they didn't shoot. Photographs of the waves and surf were taken. Using techniques learned from Sverdrup, calculations could be made of the depths of the water off shore from the conversion of the deep water swells to surf. This was the first application of Dr. Sverdrup's formulae in a theater of war. The estimations were accurate enough to be useful. Using the information, appropriate choices of landing craft were made. Two weeks later, landings were made without any mishaps.

One month later the invasion of the Philippines took place at Luzon. The surf conditions were again predicted by a Sverdrup trainee. The prediction was accurate and extremely helpful to our leaders.

A typhoon in mid-December, 1944, vividly described in "The Caine Mutiny", caused severe damage to the Third Fleet. Three of our destroyers capsized, with the loss of 800 lives. I learned of the awesome responsibility of the weather officer during that violent storm. Decisions were made that in retrospect may have added to the disaster. There was criticism of Admiral Halsey and his senior weather advisor, Commander Kosco. The tragedy called for a court of Naval Inquiry.. It turned out that the information which had been available to Kosco was incomplete and misleading. The supposed location of the typhoon was incorrect, and its strength was grossly underestimated. It's not surprising that the court found the two men blameless.

The invasion of Iwo Jima was still to come, and I made the forecast of the surf conditions. It was accurate. No unusual conditions confronted the Marines when they left their landing crafts. Sverdrup's course had been of inestimable value. Five days after the first landings, my ship, the aircraft carrier, Saratoga, suffered direct hits from kamikazes. Only superb damage control effort by the crew saved her from sinking.

The atomic bombs ended the war abruptly and removed the necessity of invading Japan itself. A debacle of the worst order was thereby avoided. Anyone who experienced the fierce defense of Iwo Jima and Okinawa knew the Japanese were not about to surrender. Invasion of the Japanese home islands, which would have cost a million lives, was obviated. I don't recall any discussions about the propriety of the Bomb at that time.

The fighting war was over. I was assigned to a new Fleet Weather Central on Guam. There was no further need for me as weather officer on an aircraft carrier which was converted to function as a troop ship. With demobilization, hundreds of thousands of men had to be brought home. Most were carried by ship, but many were flown. It was typhoon season, and weather forecasting was still a priority.

On March 31, 1946, I was hastily summoned to the headquarters of Admiral Pownall, officer-in-charge of the western Pacific. His area of command was between the territories of General MacArthur in Tokyo and Admiral Nimitz in Hawaii. His base was on Guam and been built for Admiral Nimitz to plan the anticipated final events of the war in the Pacific. The Admiral was pacing nervously in his luxurious office, clutching a sheaf of yellow dispatches in his hand as I entered the command post. An underwater earthquake of massive proportion in the Aleutians had just occurred! Tsunami waves well over 100 feet in height had been generated. The gigantic waves had wiped out a lighthouse perched on a 100-foot cliff near the epicenter. The waves traveled rapidly and had created havoc and the loss of hundreds of lives in Hilo, Hawaii. Johnson Island was erroneously reported as being under six feet of water. Admiral Pownall wanted to know when the waves would arrive at Guam and how high they would be. There were sea-level submarine pens and other installations that would be vulnerable. Using Sverdrup's formulae, I confidently predicted that the waves would be only six feet high and would arrive the next morning. The Admiral didn't fully believe me and sent out a dozen long-range scout planes to search for the waves. I told him the waves couldn't be seen from

the air, but he wished to send the planes anyway. The pilots did not see the waves. There was no significant damage. The forecast was correct. Once again, Sverdrup's formulae had come in very handy.

Sverdrup remained at Scripps for several years after the war. He then returned to Norway, where he became head of the PolarInstitute, but was in semi-retirement. Bjerknes and Holmboe continued teaching at U.C.L.A., where the science of Atmospheric Physics flourished. Kaplan remained at U.C.L.A. until 1970. He became the first president of the new International Geo-Physical Union. The Hodgkins Medal of the Smithsonian Institution was given to him in 1965. It had not been previously awarded since 1902. Jule Charney gained great reknown in Meteorology, first at the Princeton Institute of Advanced Study and then as Chairman of the Department at M.I.T. Charney's researches made him a super-star in Meteorology. The scientific basis of Meteorology had changed greatly, responding to computers and satellites. Walter Munk remained at Scripps as a Professor, teaching and creating new projects. He is active there to this day.

My last contact with Sverdrup was in January, 1957. I was spending a fellowship in Scandinavia and wished to go skiing in Norway. He answered my letter, recommending a ski resort above Lillehammer. I was invited to stay at his home for three days on my return to Oslo. On the morning of my planned departure from the ski resort, a gigantic blizzard blanketed the area. Driving was impossible. The blizzard was severe for three days. When I finally made it to Oslo, it was the last moment to board the ferry boat to Copenhagen. I called Dr. Sverdrup on the ship-to-shore phone, expressing regret in not being able to see him. Perhaps it would be possible to visit him that autumn. To my great sorrow, he died in August.

The barbarism of the Nazis cost Germany and the occupied countries dearly. Not the least cost was a significant brain drain. In the late 1930's and early 1940's thousands of writers, philosophers, physicians, physicists, musicians, theologians and other creative members of society fled Europe for the United States. Some were Nobel prize winners. Our war effort and our country profited greatly by this immigration. Most Americans are aware of the unique gifts of men such as Albert Einstein and Thomas Mann. Too few are familiar with the contributions to our war effort of Norway's Jacob Bjerknes, Jorgen Holmboe and Harald Sverdrup. Almost 1200 meteorologists had been educated by them in twelve classes at U.C.L.A. during the war. The oceanography graduates gave reliable counsel when it was needed. Many leading scientists in Meteorology today were taught and inspired by these men. The field had been founded in Norway, and Norwegians had been the world leaders. Since world war II, largely due to the impact of these three great teachers on their American students, the scope of Meteorology has increased enormously.