News of Science

IGY Whistler Observations

An informal meeting on whistlers and related audiofrequency wave phenomena was held at the Central Radio Propagation Laboratory of the National Bureau of Standards in Boulder, Colo., 14–16 Feb. The purpose was to discuss recent progress in this new field of research and to develop further the plans for the North American program of synoptic observations during the International Geophysical Year (1957–58).

The United States synoptic program will be under the joint direction of M. G. Morgan of Dartmouth College and R. A. Helliwell of Stanford University, chairman and member, respectively, of the Technical Panel on Ionospheric Physics, which is advisory to the U.S. National Committee for the IGY. These two men will be assisted by H. W. Curtis of Dartmouth, Harold Dinger of the Naval Research Laboratory, and A. Glenn Jean of the Central Radio Propagation Laboratory, who are consultants to the panel. The Canadian work in this field is under the direction of L. R. O. Storey of the Defense Research Board of Canada.

Whistlers are a special kind of natural radio signal in the audiofrequency range. They are believed to be caused principally by energy from lightning discharges that has traveled from one hemisphere to the other along lines of the earth's magnetic field in the little-explored longitudinal extraordinary mode of propagation. During propagation through the ionosphere, the energy from the causative lightning impulse is dispersed in such a way that the high frequencies usually (but not always) arrive ahead of the low frequencies and a signal of descending frequency is produced.

The reason for the considerable effort to be put forth in the study of these audiofrequency wave phenomena is twofold. First, they offer a new method for detecting the presence of ionization far beyond the reaches of the known ionosphere. This is because the paths of whistlers extend several earth radii above the earth's surface. Second, although the origins of certain related phenomena, such as the dawn chorus and hiss, are not yet known, they have been observed to be connected in some way with auroral and magnetic disturbance phenomena. Understanding in these areas, therefore, offers a potentially powerful new tool for the study of the mechanisms of aurorae and magnetic storms.

The main objective of the IGY synoptic program is the determination of the occurrence and characteristics of whistlers and related phenomena at regular intervals and at many locations on the earth's surface. Magnetic tape recordings will be made at each station during the observing periods. All useful data will be given a preliminary classification and preserved for later detailed analysis.

An important recent addition to the experimental program is the inclusion of direction-finding on atmospherics for the purpose of determining the geographic location of impulses that cause whistlers. Such information is required because very little is known about the effect of the location of the impulse on the measured characteristics of the resulting whistler.

An extensive discussion at the Boulder meeting of the requirements of recording equipment led to the following tentative specifications. Each station should be capable of recording on magnetic tape the amplitudes of all signals in the frequency range between 100 cycles and 30 kilocycles. The calibration should be given in terms of the electric or magnetic field components measured by the antenna.

Events on the magnetic tape should be timed to an accuracy of at least, ± 0.1 seconds. Each recording period should be not less than 2 minutes in length and should be repeated no less than once every hour. Special runs during World Days, periods of magnetic disturbance, rocket firings, and so forth, will be scheduled in accordance with the needs of the program.

A tentative list of stations contributing to the North American program on whistlers was developed. For convenience, these were divided into an Atlantic group, a Midcontinent group, and a Pacific group. The stations indicated as tentative are either above or below the geomagnetic latitude range 40°–65° in which maximum activity occurs. Stations marked with an asterisk are currently in operation.

Atlantic group: Thule, Greenland (tentative); Frobisher Bay, Northwest Territories (tentative); Knob Lake, Quebec*; Father Point, Quebec; Ottawa, Ontario; Halifax, Nova Scotia; Hanover, N.H.*; Washington, D.C.*; South Carolina; Bermuda*; Gainesville, Fla.*; Key West, Fla. (tentative); Huancayo, Peru (tentative), or Talara, or Trujillo; Falkland Islands (by cooperation of the United Kingdom); Port Lockroy, Antarctica (by cooperation of the United Kingdom).

Mid-continent group: Flinflon, Manitoba; Boulder, Colo.*; Battle Creek, Mich.

Pacific group: Fairbanks, Alaska*; Nome, Alaska; Anchorage, Alaska; Unalaska, Alaska*; Seattle, Wash.*; Stanford, Calif.*; Wellington, New Zealand (by cooperation of New Zealand)*; Dunedin, New Zealand (by cooperation of New Zealand)*; Macquarie Island (by cooperation of Australia).

In order to accelerate current research and obtain experience for the IGY program, it was agreed to commence at once an exchange of summaries of data between operating whistler laboratories.

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International Atomic Energy Agency

A charter for the international atomic energy agency was approved on 18 Apr. after 2 months of negotiation by the 12 nations that were selected to frame the draft: Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Portugal, the Union of South Africa, the Soviet Union, the United Kingdom, and the United States. At the same time plans were approved for an international conference next September at United Nations headquarters, when the charter will be submitted for ratification by the member nations.

The U.S. State Department issued n announcement of the outcome of the 12-power talks, but the text of the statute was not immediately made public. However, it has been reported that the agency will have a 23-man board of governors. Of these, five will represent the countries "most advanced" in nuclear technology—that is, the United States, the Soviet Union, Great Britain, France, and Canada.

Five other board members will be chosen from among eight regional

groups. The first members in this category are expected to be Brazil, South Africa, India, Australia, and Japan. There will be one country, probably Sweden, to represent nations that have technical knowledge but no uranium supplies.

Two seats will go to nations with large supplies of raw materials. These seats are expected to alternate between Belgium and Czechoslovakia one year and Poland and Portugal the next year.

Ten other members of the board of governors will be elected by the annual meeting of the agency's general conference, which will be composed of all members of the agency. These ten seats will be for underdeveloped countries that will benefit from the aid program.

Under this program, major atomic powers will contribute fissionable materials for the agency to allocate for peaceful uses in underdeveloped countries. Each country receiving such gifts will have to submit to inspection by representatives of the agency. The United States, the Soviet Union, and other countries that have a surplus of uranium would not face inspection, for the provision applies only to countries receiving aid. However, a recipient country will have the right to veto inspection by the nationals of an individual country.

The new plan for the agency, first proposed by President Eisenhower in a speech before the United Nations in December 1953, represents a major compromise. The United States and seven of its Western allies completed the first draft of the plan nearly a year ago, but it proved so controversial that no agreement could be reached. Then India suggested the 12-nation conference to review the original document.

The relationship of the agency to the United Nations was one of the most difficult problems to settle. The United States urged that it have the status of a specialized agency, like the World Health Organization, and report only to the Economic and Social Council. India felt that it should have a closer connection to the U.N., and the Soviet Union wanted it to come under the jurisdiction of the Security Council, where it would be subject to the veto power. The present agreement takes a middle course under which the agency will report primarily to the General Assembly.

Nevertheless, the September conference is expected to bring some conflicts. The Soviet Union has reserved the right to propose at that time the admission of the People's Republic of China and its appointment to the agency's board of governors. India also has objections to some of the language on inspection procedures and to the composition of the board of governors.

When these and other difficulties are overcome and the draft statute is endorsed by the 84 countries belonging to the United Nations or its specialized agencies, it must then be ratified by the parliaments of at least 18 countries, the minimum required to bring the statute into force. It is believed that this can be accomplished by June 1957.

Sea-Water Distillation

One of the largest sea-water evaporating and distilling plants ever to be built has been ordered from a firm in Glasgow, Scotland, for installation at the Netherlands Antilles island of Aruba in the Caribbean. The unit is capable of providing 8000 tons of fresh water daily. There is practically no rainfall on Aruba or any other source of fresh water. During the course of 30 years a number of smaller sea-distillation plants have been installed there, each with an output of 300 tons of fresh water a day, but increasing local demands now call for a much greater supply.

The new plant will be completed in 1958. It will comprise four horizontal evaporating units, each with it own interstage preheaters, distilling condenser, and pumps. Each unit will have a daily output of 2000 tons of fresh water. Steam, bled from turbines of the electric power generating station, will be supplied to the heating coils of the first stage of each evaporator unit.

Survey of Chemists

A comprehensive report on the economic status of the chemical profession was made public on 9 Apr. as the American Chemical Society opened its 129th national meeting in Dallas, Tex. The survey was conducted last year by Andrew Fraser of Washington, D.C., consultant, for the ACS Committee on Professional Relations and Status, of which Herman S. Bloch of Universal Oil Products, Des Plaines, Ill., is chairman. The study took the form of a questionnaire mailed to 64,606 ACS members residing in the continental United States. (The society's total membership at present is 76,522.)

Usable returns were received from 45,432 members, or 70.3 percent of the mailing list. Of the respondents, 95 percent were men and 5 percent women, most of the latter being chemists. Among the men, 63 percent were chemists, 21 percent chemical engineers, and the other 16 percent, although basically trained as chemists or chemical engineers, were in classifications designated as "other field of science or engineering" (8 percent) and "any other field" (8 percent). The Fraser report was published in full in the 9 Apr. issue of *Chemical and Engineering News*.

A comparison of 1955 earnings with those reported in two earlier ACS surveys, made in 1941 and 1943, shows a considerable rise since the war years. In 1941, base salary for beginning chemists was $132 a month at the median. By 1955, the median salary of beginners was up to $435, a 230 percent rise. For more experienced chemists the percentage increase, although not so great, was still appreciable—at the 20-year level of experience it was about 125 percent, from a median of $339 in 1941 to $763 in 1955.

When median salaries for both years were placed on a constant dollar basis by adjustment to the Bureau of Labor Statistics consumer price index, it was found that men chemists starting out in 1941 earned $209 a month, and those starting in 1955 earned $380. On the same basis, chemists with 20 years of experience drew $539 in 1941 and $666 in 1955. These figures represent income before taxes, and the report does not take into account the effect upon net income of the changes in tax structure since the war.

Changes in work patterns also appear to have been a factor in upgrading earning levels between 1941 and 1955. Last year about 20 percent of all ACS members were engaged in technical administration—a relatively high-paying field of work—compared with 15 percent in 1941. On the other hand, the proportion of members in some relatively low-paying fields declined. There were decreases, for example, from 13 to 8 percent in analysis and testing, and from 12 percent to 9 percent in college teaching.

Significant changes in sources of employment also were disclosed. In 1941 18 percent of the society's members were employed by government agencies—Federal, state, and municipal—and only 8 percent were so employed last year. In the same period, industrial employment rose from 64 to 69 percent, and jobs in teaching institutions held steady at about 12 percent. There was a sharp decline in the percentage of men chemists (19 percent to 8 percent) and chemical engineers (7 percent to 4 percent) in government work, largely the result of even sharper dips in state and municipal employment. About 13 percent of women chemists hold government jobs, compared with 18 percent in 1941, while 45 percent now work for industry—a relatively large increase over the 27-percent figure that obtained in 1941.

Of the ACS members participating in the survey, 42 percent hold doctorates, another 19 percent have the master's degree, and only 3 percent have no college degree. Chemical engineers appear to have a lesser tendency to pursue