News of Science

Chicago Low-Temperature Lab

A large noncommercial laboratory for research at temperatures near absolute zero (−460°F) was opened last month at the University of Chicago's Institute for the Study of Metals. The building will be used by physicists, chemists, and metallurgists who since 1945 have been conducting their basic experiments under the west stand of Stagg Field, where the first atomic pile was built and operated in 1942. Earl A. Long, professor of chemistry who has been at the university since 1956 and who was assistant director of Los Alamos Scientific Laboratory during World War II, is director of the Institute for the Study of Metals and of the new laboratory.

The low-temperature laboratory contains equipment that can produce 50 quarts per hour of liquid hydrogen at −423°F, and 8 quarts per hour of liquid helium at −453°F. Additional equipment to permit an output of 20 quarts of liquid helium per hour is planned.

The liquefied gases will be used in the new building's seven experiment rooms. Here, in addition to structural observations, studies will be made of such extreme cold phenomena as superconductivity of supercooled lead and the nature of the liquefied gases themselves—for example, their defiance of gravity and their frictionless flow.

Carnegie Supports Educational Psychology at Northwestern

A 3-year program of teaching, research, and training in educational psychology will be supported at Northwestern University by a grant of $156,000 from the Carnegie Corporation of New York. The Northwestern appropriation is included among new grants totaling almost half a million dollars that have just been announced by Carnegie.

Under the Northwestern program, faculty members of both the school of education and the department of psychology will join together to develop new undergraduate and graduate courses in educational psychology. These courses will include more knowledge of basic research on human behavior than is provided in the usual teacher-training curriculum. The Northwestern group will also outline a program of basic research needed in the field. A portion of the Carnegie funds will be used for the training of graduate students.

Other new Carnegie grants include one of $55,000 to the National Education Association for a conference on gifted students; another of $36,000 to Illinois Institute of Technology for the development of a new approach to mathematics teaching; and one of $66,000 to the University of Maryland for developing an experimental program of mathematics for the junior high school.

Standard Musical Pitch

One of the lesser known services of the National Bureau of Standards is the broadcasting of a musical tone of standard pitch—middle A at 440 cycles per second—over its shortwave stations WWV (Beltsville, Md.) and WWVH (Maui, Hawaii). These broadcasts make standard pitch available day and night throughout the United States and over much of the world. Since a short-wave receiver is all that is needed, easy access to standard pitch is thus provided for piano tuners and amateur and professional musicians as well as for makers of musical instruments.

A 600-cycle-per-second tone is also broadcast. This, together with the 440-cycle-per-second tone, is used by scientists, electronics engineers, and manufacturers in the measurement of short intervals of time and for calibrating instruments and devices that operate in the audio and ultrasonic frequency ranges. Both the 440- and the 600-cycle-per-second tones are obtained from an electronic, crystal-controlled oscillator and are accurate, as transmitted, to better than 1 part in 100 million.

In this country, A = 440 cycles per second has been accepted as standard pitch since 1925. Initially, this value was agreed upon by the Music Industries Chamber of Commerce as a useful compromise among the various pitches chosen arbitrarily by different musical groups. In 1936 the same pitch standard was adopted by the American Standards Association, giving it the status of an industrial standard. Three years later the International Federation of the National Standardizing Associations sponsored a conference in London. France, Germany, Great Britain, Holland, and Italy sent delegates, and the United States and Switzerland sent official messages. Six of the seven countries independently proposed A = 440 as the standard, and the conference adopted it unanimously. The same standard was again endorsed by the International Organization for Standardization in 1953 and was accepted as an ISO Recommendation in 1955.

The National Bureau of Standards maintains the A = 440 standard as the one on which general agreement has been reached. The musical merits of any particular standard are, of course, outside its province.

Previous standards of pitch were defined in terms of the frequency of a particular tuning fork or bar, or the length of a specified vibrating air column (organ pipe). Since the sound frequencies generated by these devices vary with the surrounding temperature, it is necessary to specify the temperature at which comparisons with these standards should be made.

In 1859 the "Diapason Normal" was defined in terms of a standard tuning fork deposited by the French Government at the Paris Conservatory of Music. The vibration frequency of this fork was stated to be 435 cycles per second when measured at the then standard laboratory temperature of 15°C. When R. Koenig (1880) made a careful determination of the frequency, it proved to be 435.45 cycles per second at 15°C and to have a thermal coefficient of −0.0486 cycle per second, per degree centigrade. Thus the fork would really have the defined standard frequency at slightly over 24°C.

From a technical point of view, the present standard of musical pitch, as maintained by NBS, has the advantage that it is free from the vagaries of the material objects (tuning forks, organ pipes) that embodied past standards. A tone is produced that for all practical purposes is independent of the temperature of the surroundings.

U.N. Urges Live Poliovirus Testing

A 12-nation group of experts of the World Health Organization has urged large-scale trials of a new polio vaccine prepared from live virus. The live-virus vaccine is taken by mouth instead of being injected. It is prepared from strains of virus that have been attenuated so that they are no longer able to cause the disease but stimulate protection against it.

If the trials prove successful, accord-