the pressure of the ice becomes great, and the ice rushes out, flowing at a measured rate of more than 115 feet a day. This continues until the accumulated excess of ice has run out of the basin.

After an "escape" of excess ice, the glacier behaves normally for some years until another great accumulation occurs.

Science News Letter, January 15, 1938

PHYSICS

Thermal Microscope Shows Crystal Formation at 3632° F.

SEARCH for synthetic abrasives rivalling the diamond in hardness has led to the development of a new "thermal microscope" which makes possible the observation of crystal formation and change even at high temperatures of as much as 3,632 degrees Fahrenheit.

This new tool of science was disclosed in an address by Dr. Frank J. Tone, president of the Carborundum Company, Niagara Falls, N. Y., as he accepted the prized Perkin Medal for 1938. The Perkin Medal is awarded annually by the American Section of the Society of Chemical Industry, an international chemical organization.

The diamond, said Dr. Tone, still stands as the peer of all abrasives despite various reports from time to time that some synthetic material is "just as hard." Silicon carbide—familiar carborundum—and fused alumina are the next ranking abrasive materials, said Dr. Tone, which are available and widely used in commercial quantities. But there are other new abrasives which appear to be superior to silicon carbide. Boron carbide is one which can be bonded with silicon carbide to form a superior cutting stone.

A basic handicap to the development of the very hard cutting materials has been the inability of scientists to study their structure effectively.

The new thermal microscope, which Dr. Tone described, is one new tool which makes possible more knowledge about these hardest of synthetic man-made materials. Motion picture attachments are now used with the thermal microscope so that a continuous, permanent record can be made of the formation of such material as crystalline silicon carbide at temperatures over 3,632 degrees Fahrenheit, or 2,000 degrees Centigrade.

Dr. Tone is the father of Franchot Tone, well-known motion picture actor.

Science News Letter, January 15, 1938

PHYSICS

Mass of New X-Particles May Have a Wide Range

THE MASS of the new-found "X" particle which scientists have been discovering in cosmic ray research may not have a fixed value, says Dr. Seth H. Neddermeyer of the California Institute of Technology. (*Physical Review,* Jan. 1).

Dr. Neddermeyer is a colleague of Dr. Carl Anderson and worked with him when the latter made the discovery of the positron for which he received the Nobel Prize award. The team of Anderson and Neddermeyer, too, made the initial discoveries of the "X" particle, whose mass appears to be intermediate between that of the electron and the proton.

"There are . . . reasons for believing that the mass (of the X particle) may not be unique and that many masses, ranging from a few times the electron mass up to very large values, may exist," says Dr. Neddermeyer's report, in part.

By theory, explains Dr. Neddermeyer, photons of radiant energy create pairs of particles—positive and negative in electrical sign—in their rush through the atmosphere on their way to earth. The energy and mass possessed by these new particles, that are the offspring of dying photons, are variable, postulates Dr. Neddermeyer. Thus many different masses might be observed, depending on the energy possessed by the original photon that creates them.

The point is that particles can have two kinds of mass; the so-called rest mass and a mass due to motion. Theoretically, at least, a particle moving with the speed of light should have an infinitely large mass.

The second kind of mass, which varies with the speed of the particle, was observed in the present experiments.

Science News Letter, January 15, 1938

BOTANY

Marihuana Weed Grows Where Rope Factory Failed

GOOD seed can sometimes bring forth evil fruit.

Years ago, enterprising business men in Omaha promoted an American rope-making industry based on hemp grown at home, by American farmers. The rich bottom lands of the Missouri promised to be ideal for the hemp fields, and Omaha is a good railroad shipping point. A praiseworthy project, surely, to put cash in the pockets of many people in the community.

Seed was imported, factories built, and the work started. But as it sometimes goes in the economic world, the industry failed to thrive. Hard times, unexpected factors interfering with either growth of the hemp or its processing—it's all past history now. The businessmen pocketed their losses, the farmers went back to raising corn.

Yet all was not as it had been. The hemp plant liked the soil and the climate all right, and hemp still grows in great masses in the neighborhood of Omaha as a wild weed. It is a tall, rank-growing plant, able to compete even with giant ragweed for its place in the sun.

And in the Omaha neighborhood at least, it competes with ragweed in another even eviller way. C. C. Durham, chief botanist of the Abbott Laboratories, North Chicago, in his annual survey of the distribution of hayfever pollens, states that hemp pollen is at least twenty times as abundant in air samples taken over Omaha as in any of the other hundred-odd cities where such studies are carried on.

Even worse: hemp is the raw material for the narcotic drug all too widely used by American young people as marihuana, known also by the nickname "reefers." Mr. Durham expresses wonder and some indignation that the federal government, for all its high-pressure drive against marihuana traffic, has done nothing to eliminate the weed that is its ultimate source.

Marihuana, to be sure, is not made exclusively from chance-sown wild hemp, which grows as a weed in many other

parts of the country, though nowhere so abundantly as it does in the Omaha region. Hemp is also cultivated in hidden illicit patches—it has even been found being nursed in city window boxes. But a concerted drive next spring, with CCC men or relief workers to scythe it down, would undoubtedly help to reduce materially the available hemp supplies in this country.

Science News Letter, January 15, 1938

AVIATION

Future of Aviation Progress Lies in Invisible Film of Air

Laminar Boundary Layer, Only Few Hundredths of Inch, Is Key to Perfection of Streamlining of Modern Plane

THE FUTURE of aviation is linked with an invisible film of air only a few hundredths of an inch thick. So nearly perfect is the streamlining of modern airplanes that even the protruding heads of tiny rivets can cut miles an hour from the speed of a plane and greatly lower its flight performance.

The crucial air film is known as the laminar boundary layer between the wing of a plane and the air through which it flies. If the air passes smoothly over the wing all is well. If the air becomes turbulent air resistance is increased and speed and climbing ability are decreased.

Great advances in knowledge of the behavior of this invisible air boundary have been made possible by studies in wind tunnels. But now it is becoming apparent that the day may be approaching when wind tunnel tests, alone, will not be the last word in aeronautical research.

Speaking at the first Wright Brothers' Lecture of the Institute of the Aeronautical Sciences, the British air expert, Prof. B. Melville Jones of Cambridge University, pointed out that free flight study of real airplanes may soon supply the final check on research.

Flight in smooth air, free from small-scale turbulence is needed, he indicated, to disclose some of the parasitic air friction losses now being studied. A slight unsteadiness may persist in wind tunnels which produces effects differing from those of actual flight.

Key point of investigations is a study of the so-called transition point where the smooth, laminar flow of air turns into the turbulent pattern that robs planes of their performance. The transition point should occur as far back on the wing, away from the leading edge, as is possible. In free flight tests, Prof. Jones disclosed, a thin layer of tinfoil only one five-hundredth of an inch thick was sufficient to shift the transition point forward and produce drag.

In another test the almost imperceptible film of mist on a plane's wing, after flying through a cloud, produced the same kind of increased drag.

Wind tunnels are not doomed as a tool of aeronautical research, Prof. Jones indicated to his distinguished audience that included Orville Wright who flew the first airplane. Rather the advances of wind tunnel tests are supplemented by actual flights.

Science News Letter, January 15, 1938

ENGINEERING

Radio Control of Models Offers Hams New Field

THE much-pushed-around radio amateurs who have continually "worked" the unexploited portions of the radio spectrum of wavelengths, and then found themselves pushed out as soon as commercial possibilities came into being, now have a new field of activity. It is remote-control by radio of small model airplanes.

Model airplanes, both sailplanes and craft powered with gasoline engines, have become increasingly popular throughout the nation because of their performance in distance, speed and altitude. And with some of them now 13 feet in wingspan, they are not so tiny either.

The increasing numbers of such powered models around airports has now led to a legislative ban on their uncontrolled use despite cries from the model plane enthusiasts. And in answer to those cries has come a response from the radio "hams." The solution is radio robot control of model airplanes so that they come outside the "uncontrolled" phrase in the laws.

Two Hartford radio amateurs, Ross A. Hull and R. B. Bourne, describe in the technical radio (*Turn to Page 47*)

RADIO CONTROLS MODEL PLANE

This model plane's rudder is controlled by radio controls devised by two Hartford, Conn., amateur radio operators. A model sailplane, the ship is as yet controlled only in part by the radio signals. It is the latest field to be entered by the "ham" operators, who have pioneered radio developments in dozens of ways.