

says Dr. Bartsch. "You let him alone and he'll let you alone. But you never can be sure about a barracuda."

The manta, or sea-devil, a great wide-winged, two-horned creature related to the sharks, is often reputed to be a man-eater. Legend says it will smother a fisherman in its great embrace, and then swallow him. But it is doubtful whether it ever eats anything more formidable than oysters. The manta could more justly complain about the manta-killing ac-

tivities of man, for sportsmen in the warm waters off southern California and Lower California like to fling harpoons into its tempting expanse of back, and then enjoy the somewhat hazardous thrill of being towed at high speed for hours by a half-ton of bewildered giant fish with the terror of imminent death upon it.

This article was edited from manuscript prepared by Science Service for use in illustrated newspaper magazines. Copyright, 1935, by EveryWeek Magazine and Science Service.

Science News Letter, September 14, 1935

PHYSICS

Airplane Propeller Makes World's Noisiest Roar

SOMETHING more radical than better sound insulation of airplane cabins must be found by scientists if air travelers are to be spared the roar of airplane propellers, it appears from the report of E. Z. Stowell and A. F. Deming of the laboratories of the National Advisory Committee for Aeronautics at Langley Field, Virginia.

In a new study of noise from two-blade propellers the scientists have found that the greatest noise source is the roar of the fundamental frequency. This basic noise is a musical note having twice the frequency with which the propeller is rotating. In the propeller roar as many as 50 or 60 harmonics of this fundamental note appear.

Discussing the importance of propeller noise tests, the scientists state: "It is evident that, although passengers in a commercial airplane may find the noise temporarily disagreeable, the effect of the noise upon the pilots who are immersed in it day after day may be greater and even interfere seriously with efficiency."

The two-blade airplane propeller, they point out, radiates more noise as expressed in watts of power than does almost any other continuously operating device known to man. The only exceptions are certain special signalling devices.

Propeller roar due to the blades' rotation, Stowell and Deming found in experimental studies, has a maximum at about 30 degrees on each side of the propeller's axis of rotation. This angle is just about the one which passes through the passenger seats in cabins of commercial multi-motors airplanes.

At close range and at great distances the propeller roar of rotation dominates propeller noise. At intermediate dis-

stances, however, a second noise source may be prominent. This is the tearing, ripping noise caused by the periodic release of vortices from the trailing edges of each blade. The vortex propeller noise forms a continuous sound spectrum, it has been found, in the middle range of frequencies of from 1,000 to 5,000 cycles. Vortex noise is a maximum in the line passing through the axis of the propeller in both directions and a minimum in the plane of rotation of the propeller.

The fundamental rotational noise of a propeller is the most objectionable from the viewpoint of the airplanes, state the Langley Field scientists, for (1) it masks speech readily, and (2) insulation against this low frequency is difficult.

"No great improvement can result," they conclude, "from any scheme of silencing that does not include a reduction in the magnitude of this (rotational noise) component."

The propeller noise studies were made with a variable pitch two-blade aluminum alloy propeller eight and a half feet in diameter. The propeller's pitch angle was adjusted so that it absorbed 100 horsepower from its driving motor at 1,800 revolutions per minute.

The motor and propeller were 235 feet from the nearest obstruction and capable of rotating through 360 degrees so that the noise output at various angles could be obtained with a fixed microphone. Using a special apparatus, the electrical counterpart of the sound waves as generated in the microphone and the amplifying equipment was analyzed by frequency spectral parts and photographic records obtained of any portion desired.

Science News Letter, September 14, 1935

Grade crossing accidents took 1,554 lives in this country last year.



CHAMPION ROARER

PHYSICS

Stratosphere Balloonists To Seek Sun's Neutrons

NEW FIELDS of research in stratosphere balloon ascensions should include studies to see if neutrons are being shot out by the sun, Lord Rutherford of Nelson, F. R. S., widely known physicist and head of Cavendish Laboratory, Cambridge, told the meeting of the British Association for the Advancement of Science.

In laboratory experiments neutrons, fundamental units of matter out of which atoms are composed, make possible the transmutation of one element into another.

It might be possible to detect neutrons from the sun high in the earth's atmosphere, Lord Rutherford declared, and they should be looked for as high as scientists can reach in manned and unmanned balloons.

If neutrons occur in the sun and the other stars of the universe they should be very effective in causing breaking down and building up processes among the elements by the atomic transformation discovered by Madame Curie-Joliot

and her husband M. Joliot in their Paris laboratory.

The fears of scientists that the physical laws of the conservation of energy do not hold in experiments on atomic collisions are rapidly lessening, the veteran scientist-peer told his listeners. Up until last year, he pointed out, certain tests seemed to indicate that more energy was liberated in some types of atomic collisions than was put into them.

In his opinion, Lord Rutherford continued, recent studies on the nucleus of atoms justifies the assumption, that the conservation of energy holds for all atomic transformations.

New measurements on the masses of atoms by Prof. F. W. Aston at Cambridge University in particular, Lord Rutherford indicated, have shown that the masses of some elements were not previously known with sufficient precision. Such lack of knowledge, if not proving definitely that the conservation law holds, plainly strengthens the case for the hitherto basic principle of physical science.

Science News Letter, September 14, 1935

AERONAUTICS

New Stratosphere Flight To be Made in October

RAPID City, S. D., has been selected as the site for another flight of the stratosphere in October, officials of the National Geographic Society have announced.

Studies of the weather conditions at Stratobowl in the Black Hills for the last fifteen years disclose that October usually has periods of good weather long enough to make the flight a possibility.

In the decision which will send the Society-Army Air Corps balloon Explorer II aloft again, Rapid City won out over Scott Field, Illinois, as the take-off site. Much of the equipment is still at Rapid City, and it had been decided that if weather conditions at the two places were at all comparable for October the South Dakota site would again be used.

The entire top of the Explorer II is being rebuilt in the Goodyear Zeppelin factories in Akron, Ohio, and will be delivered to Rapid City this month.

Science News Letter, September 14, 1935

23 LANGUAGES

!!! SPEAK ANY MODERN LANGUAGE
IN 3 MONTHS BY LINGUAPHONE
UNIQUE METHOD BRINGS VOICES
OF NATIVE MASTERS INTO YOUR
OWN HOME...SEND FOR FREE BOOK !!!
LINGUAPHONE INSTITUTE
35 Rockefeller Center • New York

PHYSICS

High Temperatures Calculated For Radio Roof of World

Exceedingly Low Densities of Kennelly-Heaviside Layers Declared Traceable Only to High Temperatures

IT HAS been just ten years since the existence of the radio roof surrounding the earth—the layers of ionized atmosphere which reflect radio waves—was first demonstrated. Known as the Kennelly-Heaviside layer after the American and British scientists who first postulated its existence, these reflecting layers have been the subject of intensive research ever since.

Not one, but three, layers have been found which are now called the E, F₁ and F₂ regions at heights of roughly 65, 115 and 150 miles respectively.

Much useful knowledge has already been gleaned from the ten-year research, but few more startling suggestions have occurred than that just offered by Prof. E. V. Appleton, Wheatstone professor of physics at the University of London.

Reporting new tests, Prof. Appleton, with R. Naismith as co-worker, (*Proc. Royal Society*, July), suggests that in the F₂ layer, between 124 miles and 248 miles above the surface of the earth, the temperature at noon time in summer should be 1700 degrees Fahrenheit. Such extreme temperatures are needed to provide a reasonable explanation for his experimental findings.

A temperature of 1700 degrees Fahrenheit corresponds to 927 degrees on the Centigrade scale, which is sufficient to melt elements such as cadmium, calcium, lead, lithium, magnesium, silver, tin and zinc. No man-directed balloon with a magnesium alloy gondola may ever reach altitudes of 150 miles, but what would happen to it if it did makes one pause and think.

"Owing to the low molecular density of the air at the level of the region F₂," says Prof. Appleton, "we may expect marked heating by solar radiation. This can take place as a result of molecular dissociation, or as a transfer of energy to the electrons via excited molecules, or as a result of the process of ionization generally." Such heating reduces the density of the air at which the greatest ion production can take place.

In a shorter summarizing article (*Nature*, July 13), Prof. Appleton has discussed this same point as follows:

"It is not difficult to show that the

abnormally low value of summer noon ionisation density can only be the result of a reduced summer air density at the level in question, otherwise we should have to assume that the solar ionising rays differed in quality from summer to winter. Such a reduced air density can again only be the result of an increased temperature. Putting these ideas into quantitative form, we find that the molecular temperature must be three to nine times as high on a summer noon as on a winter noon, and that the absolute temperature at a level of 300 km. must be at least 1,200° K on a summer day."

Three hundred kilometers amounts to about 186 miles, and 1,200 degrees K equals 1,700 degrees Fahrenheit.

Science News Letter, September 14, 1935

ENGINEERING

Tower and Insulators Spread Steel Network Against Sky

SYMMETRY and design typify the SCIENCE NEWS LETTER cover this week, in the illustration of a modern tower for electric transmission lines. The auxiliary copper leads carrying the current around the giant insulators can be seen hanging in large arcs at the left, near the center. The insulators must not only be of sufficient size to prevent a jump-over of the line voltage at thousands of volts to the ground but should also hinder, if possible, the much higher voltage of lightning strokes.

Science News Letter, September 14, 1935

● RADIO

Tuesday, Sept. 17, 3:30 p. m., E.S.T.
SCIENCE IN TRANSPORTATION, by Dr. C. F. Hirschfeld, chief of research, Detroit Edison Company.

Tuesday, Sept. 24, 3:30 p. m., E.S.T.
THE DEPRESSION AND MENTAL DISEASE, by Dr. Carney Landis, New York State Psychiatric Institute and Hospital.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.