

## PHYSICS

# One Hearing Aid for All

Experts discovered from war research that a hearing aid can be made to suit almost all deafened persons. They will no longer have to be individually prescribed.

► CONTRARY to the present idea that hearing aids must be individually prescribed like eyeglasses, scientists at Harvard University have discovered that one hearing aid can be made which will suit almost all deafened persons.

Specifications for the "Master Hearing Aid", developed from war research on noise and communications, appear in a report, "Hearing Aids: An Experimental Study in Design Objectives," published by Harvard University Press.

"It is only a matter of time and continued research," says Dr. S. Smith Stevens, director of the Harvard Psycho-Acoustic Laboratory, "before a hearing aid is available which will meet all the demands imposed by most deafened ears. And with the improved fidelity in amplification will come new lightness, ruggedness and general economy."

The specifications proposed for the ideal hearing aid are:

(a) An overall acoustic frequency which is uniform and without sharp peaks or valleys. The lower cut-off frequency should be not higher than 400 cycles per second (cps) or lower than 200 cps. This frequency roughly approximates the pitch of middle "C" on the piano. The higher frequency cut-off should not be lower than 3000 cps and can extend to 4000 cps. This latter frequency corresponds to four octaves above middle "C" on the piano.

(b) Between the cut-off frequencies of 300 cps and 4000 cps the overall slope of the frequency characteristic of microphone and earphone should rise toward the higher frequencies with a slope of 3 or 4 decibels per octave. A decibel is explained as a logarithmic unit of sound intensity. For instance, an airplane engine has an intensity of about 120 decibels while the buzz and hum in the average office is around 40 decibels.

(c) Maximum acoustic output should be limited so that the ear is protected against discomfort, pain or possible injury from powerful transients.

(d) The instrument must be sufficiently sensitive and free from electrical or other internally generated noise to allow it to render intelligible to a normal ear speech delivered to the instrument

at a level not more than 10 db above the unaided threshold of intelligibility of that same normal ear.

(e) Acoustic gain (amplification) varies so widely that it is probably desirable to design at least two or perhaps three different models of hearing aids.

(f) The instrument must be provided with an effective gain control with a range of at least 40 db.

(g) There must be no squeal (electrical feedback) when the instrument is operated at maximum gain setting.

Supervisor of the research project was Dr. Hallowell Davis, former associate professor of physiology at Harvard and now director of research at the Central Institute for the Deaf, St. Louis; Dr. Stevens, and Dr. R. H. Nichols, associate director of the Harvard Electro-Acoustic Laboratory.

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## PALEONTOLOGY

## Beetle 8,000,000 Years Old Entombed in Amber

► SOMETHING over 8,000,000 years ago a long-snouted beetle very much like a modern pine weevil wandered over the bark of an evergreen tree in the Baltic flat-woods. It blundered onto an ooze of sticky gum, bogged down, and

perished. The gum hardened into rosin, dropped off (perhaps during a rain-storm), was washed downstream and deeply buried in silt.

Ages later, East Prussian miners dug up the lump, now hardened into amber but still holding its entombed beetle, from a pit 90 feet deep. It was sent as a curiosity to Dr. Titus Ulke, veteran Washington, D. C., naturalist.

With L. L. Buchanan, U. S. Department of Agriculture entomologist, Dr. Ulke regarded the specimen with something more than curiosity. For the embedded weevil, though it resembled present-day insects in the genus *Pissodes*, was sufficiently different to be considered a distinct genus—something new under the sun of science. So Dr. Ulke gave it a new zoological name, *Paleopissodes weingangae*. The specimen is now in the Academy of Natural Sciences.

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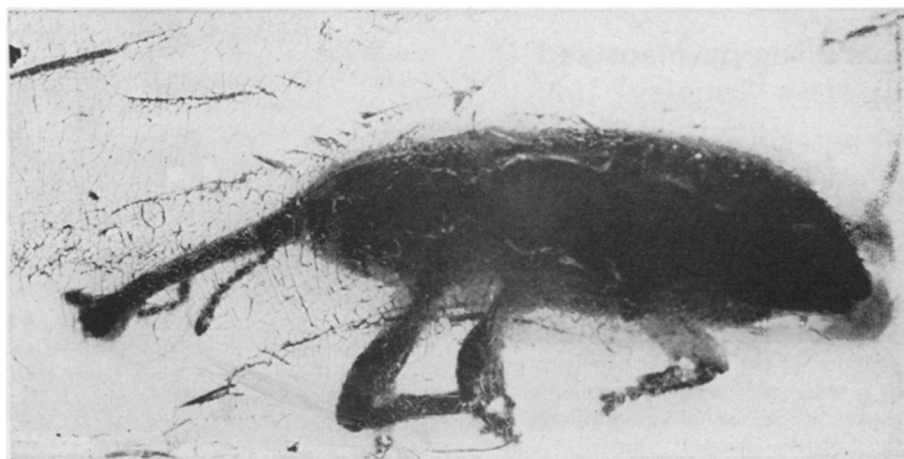
## ASTROPHYSICS

## Sea-Level Observatory to Measure Sun's Radiation

► TO measure the effect of the lowermost and most humid layer of the earth's atmosphere on radiation coming through from the sun, the Smithsonian Institution is establishing a new astrophysical observatory at Miami, Fla.

Readings taken there will be compared with those from the Institution's already existing astrophysical laboratories, which are on high, dry mountaintops—one on Table Mountain in California, the other on Mount Montezuma in Chile. A site in Mexico is now being sought for a third.

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**ENTOMBED BEETLE**—An 8,000,000-year-old beetle found in a piece of amber uncovered by East Prussian miners. It is new to modern science. The photograph is considerably enlarged.