

ty feet up, while the biggest barracuda is seldom more than a six-footer. In general appearance the barracuda resembles the muskallunge of freshwater lakes in the North, and his pike-like manners correspond well to his greater size. Curiously enough, though, the barracuda is not very closely related to the fierce freshwater cousins, muskallunge and pike, but has as his next of kin the rather good-natured, mild-mannered mullets, which also abound off the coast of Florida.

*Science News Letter, April 28, 1934*

## SEISMOLOGY

**Earthquakes of the Week**

**N**ORTHERN VERMONT experienced a local earthquake of 20 seconds duration Saturday night, April 14, 9:58 p. m., E.S.T. Prof. E. C. Jacobs, University of Vermont seismologist, rated it as a feeble shock of intensity four on the Rossi-Forrel scale. It was too near to develop characteristic waves on the seismographic record.

The strong earthquake that was recorded on the seismographs of the world on Sunday the 15th was centered near the island of Mindanao in the Philippine Islands, the U. S. Coast and Geodetic Survey has determined, using seismological reports telegraphed to Science Service. Strong shocks have occurred in this area before. The longitude and latitude of the approximate epicenter was 8 degrees North and 127 degrees East. The time of origin was 5:15½ p. m. E.S.T.

Seismologic stations reporting the Philippine quake were: Meteorological Observatory, Victoria, B. C.; Georgetown University, Washington, D. C.; Fordham University, New York City; U. S. Coast and Geodetic Survey stations at Honolulu, Tucson, Ariz., and Chicago.

*Science News Letter, April 28, 1934*

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## PSYCHOLOGY

**Loud Sounds Seem Lower In Pitch Than Softer Tones**

**T**HE INTENSITY of a sound and its frequency are quite distinct physical attributes, but the corresponding psychological attributes of loudness and pitch are not so independent; a loud tone sounds lower in pitch than a high one, and a low tone sounds unduly loud, it was indicated by a report to the National Academy of Sciences delivered at the annual meeting by Dr. Harvey Fletcher, of the Bell Telephone Laboratories, New York City.

A group of ordinary listeners who took part in the reported experiment found that a 50-cycle tone with an intensity which is 10,000 times that of a just barely audible sound appears just as loud as a 1,000 cycle tone with an intensity 1,000,000,000 times that of the threshold.

The apparent pitch of a tone also de-

pends upon its intensity, it was found. The pitch of a 200-cycle tone was heard as being as much as a quarter of an octave lower at the very high intensities than at the low intensities. However, when the tones were of very high frequencies, near 2,000 or 3,000 cycles, such changes of apparent pitch with intensity were not observed.

When ten tones are sounded together, is the resulting sound ten times as loud as each one alone? Speaking from the point of view of physics, the answer is yes. But speaking from the point of view of psychology, it all depends upon the pitch of the component tones. The loudness of one such complex tone with frequencies which are harmonics of 500 cycles per second was found to be one thousand times louder than one of the components instead of only ten times.

*Science News Letter, April 28, 1934*

**• First Glances at New Books**

Additional Reviews  
On Page 271

**Mining—Economics**

**THE ECONOMICS OF MINING**—Theodore Jesse Hoover—*Stanford Univ. Press*, 547 p., \$6. Mining is not a mere matter of geology and metallurgy. It involves dollars and cents as well. This book by Stanford University's engineering dean deals with valuation, organization and management of non-ferrous mines. Addressed primarily to young mining engineers, the book seeks to answer: How may the metal mining industry get the most for its money in the long run?

*Science News Letter, April 28, 1934*

**Biology**

**ADAPTATION ECOLOGIE ET BIOCOENOTIQUE**—Marcel Prenant—*Hermann et Cie. (Paris)*, 60 p., 15 fr.

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**Geology**

**METAMORPHISM**—Alfred Harker—*Dutton*, 360 p., \$5.90. Dr. Harker approaches metamorphism from the dynamic point of view; he considers the process first, the products afterwards. His treatment of the process is two-fold: first thermal, then regional metamorphism. This book will be highly valuable to more advanced students in geol-

ogy, who will also find the very numerous diagrams, drawn from microscope studies, of great assistance in rendering unmistakable the clear descriptions in the text.

*Science News Letter, April 28, 1934*

**Biology**

**DYSHARMONIES ET DISCONTINUITES DANS LA CROISSANCE**—Georges Tessier—*Hermann et Cie. (Paris)*, 39 p., 10 fr.

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**Biology**

**LES PAGURES OU BERNARDS L'ERMITE (UN EXEMPLE D'ADAPTATION)**—Charles Pérez—*Hermann et Cie. (Paris)*, 33 p., 9 fr.

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**Biology**

**POLARISATION ET DEPolarISATION CELLULAIRES**—M. Dubuisson—*Hermann et Cie. (Paris)*, 47 p., 12 fr.

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**Biology**

**REPRODUCTION SEXUALITE HEREDITÉ**—Georges Bohn—*Hermann et Cie. (Paris)*, 89 p., 15 fr.

*Science News Letter, April 28, 1934*