

of the arc is used as a source of sound. The sound receiver is a non-oscillatory spark discharge, the voltage of which changes abruptly when a sound wave is received; the change is recorded by an oscillograph. Time intervals recorded in this way are plotted for different lengths of the arc, and from this curve the velocity, free from end corrections, is obtained as a slope. From the velocity of sound in the arc, the temperature can be deduced, allowance being made for changes in density due to dissociation and in specific heats due to excitation. The temperature of the copper arc is about  $4,000^{\circ}$  K. to within  $200^{\circ}$ ; it is very sensitive to metallic vapour content. J. A. STRATTON: Spheroidal functions. These functions are defined and their properties discussed from the point of view of physical applications. PHILIP M. MORSE: Addition formulæ for spheroidal functions. They can be used in the study of wave motion in elliptic cylinder and in spheroidal co-ordinates, and in particular in dealing with diffraction problems. PAUL S. EPSTEIN: On the bending of electromagnetic micro-waves below the horizon. A theoretical discussion of the transmission of radiations of wave-lengths of the order of 50 cm., based on Huygen's principle. The earth is regarded as a perfectly absorbing screen, and the effect of the atmosphere is neglected. The formulæ derived give results qualitatively in agreement with those obtained by Marconi for radiations from Rocca di Papa on wave-lengths of 50–60 cm.

### Forthcoming Events

[Meetings marked with an asterisk are open to the public.]

#### Sunday, April 7

BRITISH MUSEUM (NATURAL HISTORY), at 3 and 4.30.—M. A. Phillips: "Fossil Reptiles".\*

#### Monday, April 8

BRITISH MUSEUM (NATURAL HISTORY), at 11.30.—M. Burton: "Diving Methods employed in Sponge Fisheries".\*

VICTORIA INSTITUTE, at 4.30.—Rev. Samuel M. Zwemer: "The Origin of Religion—by Evolution or by Revelation".

#### Tuesday, April 9

ROYAL PHOTOGRAPHIC SOCIETY (SCIENTIFIC AND TECHNICAL GROUP).—Dr. P. W. Cunliffe: "Photography in Wool Research".

#### Thursday, April 11

INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—N. Ashbridge, H. Bishop and B. N. MacLarty: "The Droitwich Broadcasting Station".

#### Friday, April 12

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—A. Fage: "Aerodynamical Research and Hydraulic Practice" (Extra General Meeting).

INSTITUTION OF NAVAL ARCHITECTS, April 10–12.—Annual Meeting to be held at the Royal Society of Arts, John Street, Adelphi, W.C.2.

April 10, at 10.30.—Lord Stonehaven: Presidential Address.

### Official Publications Received

#### GREAT BRITAIN AND IRELAND

University College, Southampton. Avon Biological Research: Annual Report, 1933–34. Pp. 76+4 plates. (Southampton: University College.) 2s. 6d.

Air Ministry: Aeronautical Research Committee: Reports and Memoranda. No. 1620 (A. 157): Abstract—Transverse Tests on Sand Cast Aluminium Alloy Bars. By C. E. Phillips and J. D. Grogan. Pp. 2. (London: H.M. Stationery Office.) 2d. net.

The Institute of Physics. Conference on Industrial Physics, Manchester, March 28th, 29th, 30th, 1935: Handbook. Pp. 16. Industrial Physics Conference on Vacuum Devices in Research and Industry: Catalogue of the Exhibition, Manchester 1935. Pp. 40+xxii. (London: Institute of Physics.)

Liverpool Observatory and Tidal Institute. Annual Report 1934. Pp. 15. (Liverpool.)

Proceedings of the Royal Society of Edinburgh, Session 1934–1935. Vol. 55, Part 1, No. 4: On Least Squares and Linear Combination of Observations. By Dr. A. C. Aitken. Pp. 42–48. (Edinburgh: Robert Grant and Son; London: Williams and Norgate, Ltd.) 6d.

Report of the Marlborough College Natural History Society for the Year ending Christmas, 1934. (No. 83.) Pp. 126+2 plates. (Marlborough: Marlborough College.) Members, 3s.; non-Members, 5s.

Society of Chemical Industry: Chemical Engineering Group. Proceedings, Vol. 15, 1933. Pp. 136+6 plates. (London: Chemical Engineering Group.) 10s. 6d.

#### OTHER COUNTRIES

Second Report of the Royal Institute of Science, Bombay (1926–1934). Pp. ii+73. (Bombay: Royal Institute of Science.) Gratis.

Bulletin of the National Research Council. No. 96: Selected Topics in Algebraic Geometry, II. Supplemental Report of the Committee on Rational Transformations. Pp. xii+84. (Washington, D.C.: National Academy of Sciences.) 1 dollar.

Sveriges Geologiska Undersökning. Ser. Aa, No. 176: Beskrivning till kartbladet Storvik. Av B. Asklund och R. Sandegren. Pp. 150+2 plates. (Stockholm: Sveriges Geologiska Undersökning.) 4.00 kr.

The Science Reports of the Tôhoku Imperial University, Sendai, Japan. Second Series (Geology), Vol. 16, No. 3: On the Growth Rate of Reef Corals and the Sea Water Temperature in the Japanese Islands during the latest Geological Times. By Ting Ying H. Ma. Pp. 25+4 plates. (Tôkyô and Sendai: Maruzen Co., Ltd.)

University of Illinois: Engineering Experiment Station. Bulletin 269: Laboratory Tests of Three-Span Reinforced Concrete Arch Ribs on Slender Piers. By Wilbur M. Wilson and Ralph W. Kluge. Pp. 122. 1 dollar. Bulletin No. 271: Determination of Mean Specific Heats at High Temperatures of some Commercial Glasses. By Prof. Cullen W. Parmelee and Alfred E. Badger. Pp. 24. 30 cents. Bulletin No. 272: The Creep and Fracture of Lead and Lead Alloys. By Prof. Herbert F. Moore, Bernard B. Betty and Curtis W. Dollins. Pp. 50. 50 cents. (Urbana, Ill.: University of Illinois.)

Sudan Government: Wellcome Tropical Research Laboratories. Chemical Section, Publication No. 68: Report of the Government Chemist for the Year 1934. Pp. 13. (Khartoum: Wellcome Tropical Research Laboratories.)

Government of India: Department of Industries and Labour. Functions and Organisation of the India Meteorological Department, 1935. Pp. 25. (Simla: Government of India Press.)

New York Academy of Sciences. Scientific Survey of Porto Rico and the Virgin Islands. Vol. 15, Part 2: Crustacea Macrura and Anomura of Porto Rico and the Virgin Islands, by Waldo L. Schmitt; The Amphipods of Porto Rico and the Virgin Islands, by Clarence R. Shoemaker. Pp. 125–262+4 plates. (New York: New York Academy of Sciences.) 2 dollars.

A Manual on the Air Seasoning of Indian Timbers. By Dr. S. N. Kapur. Pp. vii+113+11 plates. (Delhi: Manager of Publications.) 3 rupees; 5s. 3d.

Annual Report of the Patna Science College Philosophical Society for the Session 1933–34. Pp. 5. Bulletin of the Patna Science College Philosophical Society. No. 5: Dr. K. S. Caldwell Commemoration Number. Pp. iv+71. (Patna: Patna Science College.)

Meddelelser fra Kommissionen for Danmarks Fiskeri- og Havundersøgelser. Serie Hydrografi, Bind 3, Nr. 1: Temperaturmessung mit elektrischem Widerstandsthermometer auf der Kattegatsexpedition im August 1931. Von J. P. Jacobsen. Pp. 22. Serie Fiskeri, Bind 9, Nr. 5: Periodic Fluctuations in the Size of Various Stocks of Fish and their Causes. By Aage J. C. Jensen. Pp. 71. 5.00 kr. Serie Fiskeri, Bind 9, No. 7: Marking Experiments with Cod at the Faroes. 2: Second Report: Experiments in 1923–1927. By A. C. Strubberg. Pp. 36. 3.00 kr. (København: C. A. Reitzels Forlag.)

Memoirs of the Geological Survey of India. Palaeontologia Indica. New Series, Vol. 20, Memoir No. 5: The Triassic, Jurassic and Cretaceous Gastropoda and Lamellibranchia of the Attock District. By L. R. Cox. Pp. v+27+2 plates. (Calcutta: Geological Survey of India.) 1.14 rupees; 3s. 3d.

#### CATALOGUES

The Wild-Barfield Heat-Treatment Journal. Vol. 1, No. 4. March. Pp. 41–54. (London: Wild-Barfield Electric Furnaces, Ltd.)

Botanical Books: Herbaria, Monographs, Floras, On Gardens and their Management, Wild Flowers, etc. (Catalogue No. 233.) Pp. 40. (London: Dulau and Co., Ltd.)

The "Wigmor" Epidoscope. Pp. 4. (London: Newton and Co.) A Selection of Interesting Books on a Great Variety of Subjects. (No. 500.) Pp. 156. (London: Bernard Quaritch, Ltd.)

Micro-Projection Apparatus. (List MP. 1935.) Pp. 12. (Manchester: Plattner and Garnett, Ltd.)

Heffer's Book Adviser. No. 8, March: Spring Announcements. Pp. 56. (Cambridge: W. Heffer and Sons, Ltd.)