moving my pen across the page, there is some possibility, however small, of error). This latter conclusion is based on the assumption that, as all statements about the empirical are based on evidence, there may at any given point be more evidence forthcoming which would shake the certainty of the statement.

In defence of intuitive knowledge the author maintains that there are propositions which depend on evidence but yet are absolutely certain because there is such a thing as conclusive evidence. For example, I do know my hand is now moving my pen across the page. This is an example of undoubted knowledge. This has been said before, of course, but it was worth while saying again in face of modern tendencies to dissolve away knowledge into mere guessing about a universe hidden behind the veil of sensation.

## PERICARDIUM AND PERICARDIAL GLAND IN THE LAMELLIBRANCHIA

THE most recent number of the *Proceedings of the Malacological Society of London* (25, Pt. 2) is entirely occupied by an important paper by Dr. Kathleen M. White on "The Pericardial Cavity and Pericardial Gland of the Lamellibranchia". Present and future workers on the morphology of the Lamellibranchs will be grateful for this paper which, without unnecessary verbosity, summarizes existing knowledge on the subject and adds materially to it. A wide range of material was examined, some eighty species from seventy-one genera and forty-six families. Excellent figures are given of conditions in many species.

The pericardial gland arises as paired groups of cells on the anterior part of the pericardium. It may extend over the auricles only or over the dorsal and ventral surfaces of the pericardium and into neighbouring parts of the mantle. In both cases it is paired and both pairs of glands may be present. The function is certainly excretory but the exact relation of this to that of the kidneys remains somewhat obscure. In only one family (Donacidæ) and five isolated genera was the gland absent. The case of Pinna is interesting. Here the gland was found in only three out of seven species. Miss White correlates this with the presence of a pre-oral gland, following Stenta who described this strange organ. It is absent in those species in which the pericardial gland is best developed. There is matter for further investigation here. The pre-oral gland opens into the infra-branchial chamber and is therefore unlikely to be concerned with the extrusion of fluid excrement, which would have to pass through the gills. On the other hand, it could produce solid excrement because this would be ejected with other waste particles by way of the *inhalant* opening.

The variable relations between the heart and the rectum are mentioned. Typically, the rectum traverses the heart, but in a few species it passes above or below the heart. Miss White discusses possible functional relations between the two organs, but these seem improbable and it is more likely that the different relations arise from purely morphological causes. The interesting discovery was made that the gonad may extend into the mantle in species of Arca, Spondylus and Chama, a condition hitherto recorded only in the Mytilidæ and Anomiidæ.

## INSULATOR GLAZES

AN article by E. Rosenthal in the *Electrical Review* of November 27 discusses the influence of insulator glazes on porcelain, having particular reference to high-voltage insulators. Under a strong microscope the surfaces of unglazed ceramic materials show minute projecting peaks which make it evident that the quality of the surface has a great bearing on the surface resistivity. This, in turn, is largely dependent on the humidity skin which, in a moist atmosphere, forms on any surface to a thickness that increases with the surface roughness and with atmospheric humidity. With 30 per cent humidity, the surface resistance of unglazed porcelain ranges between 20 and 40 $\times 10^{12}$ ohms / sq. cm., but with 98 per cent humidity it is only about $0{\cdot}001 \times 10^{12}$. This decrease in surface resistivity is smaller the smoother the surface. In a dry atmosphere glazed porcelain has approximately the same surface resistance as unglazed porcelain, but in a humid atmosphere of, for example, 98 per cent humidity the figure becomes $0{\cdot}1 \times 10^{12}$ ohms/sq. cm. This dependence of surface resistivity on the quality of the surface and on the humidity content of the atmosphere is a characteristic not only of porcelain but also of all insulating materials.

The glaze on a porcelain insulator is composed of raw materials similar to those used for the body, but fluxes are added which cause the mixture to melt at the firing temperature of the insulator (1,300–1,400° C.). High-temperature insulator glazes (fired at a temperature of 1,300° C. and higher) have not only a very great influence on the surface resistivity of the insulator but also on its mechanical and physical characteristics. One of the most important factors which influence the mechanical characteristics of the glazed body is the ratio of the heat expansion of the glaze to that of the body. The most suitable glaze must be found by numerous experiments (by trial and error) for each and every body. The tensile strength, the modulus of rupture and other mechanical characteristics may be improved very considerably by the application of a glaze, the thermal coefficient of which bears the proper ratio to the thermal coefficient of the body.

The resistance to sudden temperature changes, however, may be more favourably influenced by another glaze. If the thermal expansion of the glaze does not agree with that of the body, a considerable decrease in mechanical strength may result.

Many experiments on tensile strength have been carried out in different countries and the results have been published by various authorities. In the United States it is reported that in special cases the tensile strength is increased by as much as 80 per cent by a suitable glaze, and an increase of 40 per cent is quite normal. Similar results have been obtained by Continental research workers, the tensile strength of unglazed porcelain being given as 240–320 kgm./sq. cm. and of glazed porcelain as 300–500 kgm./sq. cm. Tests carried out in English factory laboratories give similar results. The application of a suitable glaze not only increases the tensile strength but also the other mechanical characteristics. For example, the minimum compressive strengths of unglazed cylindrical test specimens possessing cross-sections of 160, 80 and 20 sq. cm. are 900, 1,000 and 1,700 kgm./sq. cm. respectively. Corresponding figures for glazed cylinders are 2,000, 2,300 and 4,300 kgm./sq. cm. These considerations apply only to porcelain glazes

which fuse at the vitrification temperature of the porcelain as generally used in high-voltage insulator manufacture.

Glazes which are applied to the finished ceramic article and which are fused in a second firing at a lower temperature behave differently and are not able to increase the mechanical stress of the ceramic article. In contradistinction to high-voltage insulator glazes, this type of glaze must contain strong fluxes like lead oxide, etc., which are not present in the porcelain body. These glazes form, with the surface layer of the porcelain, combinations which may behave very differently from the body. The composition of the glaze does not in this case play so predominating a part as in the case of high-tension insulator glazes.

In insulator design, much use is made of the strengthening effect of the glaze on insulator bodies. Previously, the attachment of the porcelain to the metal work was facilitated by the provision of unglazed or partially glazed surfaces in contact with cement. In present-day designs, in place of the conventional form of insulator head, a smooth and unbroken glazed surface—especially in the design of cap-and-pin insulators—has been introduced. Other types which make use of the strengthening effect of the glazes on insulator bodies are the solid-core line and station post insulators, and the so-called motor and long-rod insulators which are used on the Continent to a very great extent as suspension and strain insulators.

## FORTHCOMING EVENTS

### Friday, January 1

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 2.30 p.m.—Miss Evelyn Cheesman: "Camps in New Guinea" (First Christmas Lecture).

## APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

ANALYTICAL CHEMIST to the City of York Electricity Department—The City Electrical Engineer, Electricity Offices, Clifford Street, York (endorsed 'Chemist') (December 31).

HEADMASTER of Felsted School—The Clerk to the Governors, Mr. Norman Orfeur, Solicitor, Braintree, Essex (December 31).

CHIEF LAND DRAINAGE OFFICER—The Executive Officer, Bucks War Agricultural Executive Committee, County Offices, Aylesbury, Bucks (Jan. 1).

LECTURER IN CHEMISTRY at the Brighton Technical College—The Education Officer, 54 Old Steine, Brighton, 1 (Jan. 8).

HEAD of the Engineering Department—The Principal and Clerk to the Governing Body, Wigan and District Mining and Technical College, Wigan (January 9).

LECTURER IN MECHANICAL ENGINEERING in the Oxford Schools of Technology, Art and Commerce—The Chief Education Officer, City Education Office, 77 George Street, Oxford (Jan. 17).

DIRECTOR of the National Froebel Foundation—The Secretary, National Froebel Foundation, 2 Manchester Square, London, W.1 (February 27).

CHAIR OF MINING—The Secretary, the University, Edmund Street Birmingham, 3 (March 1)

TWO CHEMISTS IN THE MINISTRY OF SUPPLY whose duties would b of an advisory, non-experimental nature—The Ministry of Labour and National Service, Central (Technical and Scientific) Register (Reference F.651), Sardinia Street, Kingsway, London, W.C.2.

## REPORTS and other PUBLICATIONS

*(not included in the monthly Books Supplement)*

### Great Britain and Ireland

Abstracts of Dissertations approved for the Ph.D., M.Sc., and M.Litt. Degrees in the University of Cambridge during the Academical Year 1940–1941. Pp. 120. (Cambridge: At the University Press.) [412

University of Cambridge: Solar Physics Observatory. Report for the Year 1941 October 1 to 1942 September 30. Pp. 2. (Cambridge: Solar Physics Observatory.) [1112

Geology and Geologists in the War and the Peace. A Talk given before the Parliamentary and Scientific Committee by Prof. H. H. Read. Pp. 20. (London: Parliamentary and Scientific Committee.) [1412

The London Naturalist. The Journal of the London Natural History Society for the Year 1941. Pp. 52. (London: London Natural History Society.) 3*s*. 6*d*. [1712

Geological Survey of Great Britain: England and Wales. Wartime Pamphlet No. 8: British Phosphates, Part 4: Occurrences of Phosphate in Pre-Cretaceous Rocks. By Dr. Kenneth P. Oakley. Pp. 27. 1*s*. 6*d*. Wartime Pamphlet No. 13: Limestones of Scotland, Area 7: Northern and North-Western Scotland. By Dr. T. Robertson, J. Knox and Dr. J. G. C. Anderson; with Analyses by Dr. A. Muir and H. G. M. Hardie. Pp. 36. 1*s*. 9*d*. (London: Geological Survey and Museum.) [1712

The London Bird Report for 1941: an Annual Report on Bird-Life within Twenty Miles of St. Paul's Cathedral. Edited by R. S. R. Fitter, assisted by R. W. Hale and E. R. Parrinder. Pp. 20. (London: London Natural History Society.) 1*s*. 6*d*. [1712

Scottish Office. Report of the Committee on Hydro-Electric Development in Scotland. (Cmd. 6406.) Pp. 38. (London: H.M. Stationery Office.) 9*d*. net. [1712

British Empire Cancer Campaign. Nineteenth Annual Report, 1942. Edited by J. P. Lockhart-Mummery. Pp. 86. (London: British Empire Cancer Campaign.) [1812

Proceedings of the Royal Irish Academy. Vol. 48, Section A, No. 3: Early Stages of Dark Adaptation in the Central Parts of the Retina. By R. W. Ditchburn and E. J. Power-Steele. Pp. 55–89. 2*s*. Vol. 48, Section B, Nos. 5–6: Oxygen Consumption in relation to Temperature and Fatty Acid Composition in the Frog and Earthworm; The Influence of Fatty Acids on the Oxygen Consumption of the Tissues in relation to Temperature and the Theory of Temperature Regulation. By J. M. O'Connor. Pp. 85–103. 1*s*. Vol. 48, Section B, No. 7: A Note on the Morphology and Cytology of the Branchiæ of *Carcinus maenas*. By J. D. Smyth. Pp. 105–118+plate 1. 1*s*. (Dublin: Hodges, Figgis and Co., Ltd.; London: Williams and Norgate, Ltd.) [1812

### Other Countries

Scientific Publications of the Cleveland Museum of Natural History. Vol. 5, No. 6: The Ohio Recent Mammal Collection in the Cleveland Museum of Natural History. By B. Patterson Bole, Jr., and Philip N. Moulthrop. Pp. 83–101. (Cleveland, Ohio: Cleveland Museum of Natural History.) [312

Astrographic Catalogue 1900·0. Sydney Section, Dec. —51° to —65°, from Photographs taken at the Sydney Observatory, New South Wales, Australia. Vol. 23: R.A. 12h. to 18h., Dec. —56° to —58°, Plate Centres Dec. —57°. Pp. ii+96. (Sydney: Government Printer.) [1412

South Australia: Institute of Medical and Veterinary Science. Fourth Annual Report of the Council, July 1941–June 1942. Pp. 12. (Adelaide: Institute of Medical and Veterinary Science.) [1412

Proceedings of the California Academy of Sciences, Fourth Series. Vol. 23, No. 34: Reef Corals from the California Middle Eocene. By J. Wyatt Durham. Pp. 503–510+plate 4. (San Francisco: California Academy of Sciences.) [1412

U.S. Department of Agriculture. Leaflet No. 225: Protecting Market Sweet Corn from the European Corn Borer. By W. A. Baker, D. D. Questel and C. H. Batchelder. Pp. 7. (Washington, D.C.: Government Printing Office.) 5 cents. [1412

U.S. Office of Education: Federal Security Agency. Education and National Defense Series, Pamphlet No. 20: How Rural Youth may Serve. Pp. vi+34. (Washington, D.C.: Government Printing Office.) 15 cents. [1412

Solar Prominences in Motion. By Robert R. McMath. (From the Smithsonian Report for 1940.) (Publication 3634.) Pp. 121–130+6 plates. (Washington, D.C.: Smithsonian Institution.) [1412

Smithsonian Miscellaneous Collections. Vol. 103, No. 4: Archeological and Geological Investigations in the San Jon District, Eastern New Mexico. By Frank H. H. Roberts, Jr. (Publication 3692.) Pp. ii+30+9 plates. (Washington, D.C.: Smithsonian Institution.) [1412

Cooper Union for the Advancement of Science and Art. Eighty-third Annual Report, July 1, 1942. Pp. iii+173. (New York: Cooper Union for the Advancement of Science and Art.) [1412

University of Cape Town. Communications from the School of African Studies. New Series No. 4: Notes on Archæological Method with Special Reference to South African Conditions. By A. J. H. Goodwin. Pp. ii+27. 2*s*. 6*d*. New Series No. 5: The Bored Stones of Southern Africa, Part 2: Prehistoric Types of the North-Eastern and Central Regions of the Union. By A. J. H. Goodwin. Pp. ii+25. 2*s*. (Cape Town: University of Cape Town.) [1512

Bulletin of the American Museum of Natural History. Vol. 80, Art. 5: The Sexual Behavior of Anura, 1: The Normal Mating Pattern of *Rana pipiens*. By G. Kingsley Noble and Lester R. Aronson. Pp. 127–142+1 plate. (New York: American Museum of Natural History.) [1712

U.S. Department of Agriculture. Circular No. 657: Mineral-Oil Treatment of Sweet Corn for Earworm Control. By George W. Barber. Pp. 16. Farmers' Bulletin No. 1906: Insect Pests of Stored Rice and their Control. By August I. Balzer. Pp. ii+22. 5 cents. (Washington, D.C.: Government Printing Office.) [1712

### Catalogues

A Catalogue of Books, consisting largely of Recent Miscellaneous Purchases, including works on Bibliography and Manuscripts, Botany, English History and Literature, Fine Arts, Natural History, and a Selection of New and Recent Publications. (No. 605.) Pp. 44. (London: Bernard Quaritch, Ltd.)