it to break loose, and warming, such as it may receive when used to attach writing points to signal magnets, does not cause it to melt.

R. R. DURANT

OHIO STATE UNIVERSITY,
COLUMBUS, OHIO

A "DATA" OF RESEARCH

WITH regard to the note on the pronunciation of "research" by Dr. Kopeloff in SCIENCE for March 23, 1928: To an ex-philologer the use of the singular verb with "data" is even more annoying than its mispronunciation (whatever the correct pronunciation may be). The next generation will very likely have forgotten that it ever had a plural verb. There has been suggested the ethical distinction that research denotes scientific investigation proper; while résearch denotes work of a compiling or reclassifying nature under direction.

From the point of view of linguistics we were taught that languages with stress-accents like the American-English tended to pull the accents towards the beginnings of words. Two examples of this process occur to me. As a boy I recall frequently having heard "advertisement" accented on the third syllable. One almost never hears this now and seldom on the second syllable, the dominant position of the accent being on the first. Within more recent years the word "automobile" has become generally accented on the first syllable, although in its early days it was frequently accented on the last and occasionally on the third syllable.

F. L. WELLS

BOSTON PSYCHOPATHIC HOSPITAL

SCIENTIFIC BOOKS

Brachiopod Morphology and Genera (Recent and Tertiary. By J. ALLAN THOMSON, director of the Dominion Museum, Wellington, New Zealand. Man. No. 7, N. Z. Board Sci. and Art, 1927. Obtainable from the Government Printer, Wellington, or the High Commissioner for New Zealand, London. Price, 17s. 6d.

STUDENTS of brachiopods, recent or fossil, will welcome this well-reasoned contribution to their literature, which is the culmination of a series of papers beginning in 1915. The book falls into three major divisions—morphology, classification and description of genera and species. As might be expected from the earlier papers, the section on brachiopod morphology (pp. 1–108) is particularly valuable, bringing together, as it does, all our present knowledge of the soft parts of these animals, the stages of development through which they pass, and the various shell parts, external and internal, with their growing terminology, treated in considerable detail and well illustrated.

In the section on classification, Dr. Thomson proposes two new major divisions, Gastrocaulia and Pygocaulia, which are practically coextensive with Huxley's Inarticulata and Articulata; in the new classification, however, the division is made on the mode of origin of the pedicle which in the Gastrocaulia develops "within the valves of the protegulum during the free-swimming stage from the ventral mantle-lobe and subsequently is protruded," whereas in the Pygocaulia it arises out of "the caudal segment of the embryo and is never enclosed within the shell." Well founded as these new divisions are, however, it will doubtless be difficult for them to displace the long-established Huxleyan terms. Within the Gastrocaulia he includes the orders Atremata and Neotremata of Beecher, with amended diagnoses, but within the Pygocaulia, in addition to Beecher's Protremata and Telotremata, he makes a new order, Paleotremata, to include the Rustellacea and Kutorginacea, *i.e.*, "primitive Pygocaulia without fully developed articulation or delthyria." The reviewer agrees that these two superfamilies should be removed from the Atremata, but would refer them to the Protremata rather than create a new order. Nor can he accept Thomson's reference of the Paterinidae (Paterinacea) to the Neotremata, since they show all the ordinal characters of the Atremata. The shell growth in typical *Paterina* is hemiperipheral, while in most of the Micromitras it is mixoperipheral; nevertheless, the pedicle issues from between the two valves instead of being restricted to the ventral valve as in Neotremata. The Acrotretacea of the Neotremata may, as Thomson thinks, have come out of the Paterinidae, but this remains to be demonstrated. His view that the most primitive Telotremata (Rhynchonellacea) arose in the Protremata is probably also correct, but here again we do not know the actual stock of origin.

The descriptive portion of the work (pp. 120–297) deals with sixty-nine genera, eight of which are new: *Hispanirhynchia, Abyssothyris, Japanithyris, Jaffaia, Pictothyris, Neobouchardia, Pirothyris, Malleia.* Each genus is classified, briefly diagnosed, its synonyms cited, and illustrated by a line drawing of (in the majority of instances) the genotype, making the book a dependable standard of reference. Two new subfamilies are proposed: Platidiinae, to include *Amphithyris* Thomson 1918 and *Platidia* Costa 1852; and Laqueinae, to include *Laqueus* Dall 1870 and *Pictothyris* n. gen.

The volume closes with a table showing the range in time and space of the Australian Tertiary brachiopods, a selected bibliography and a full index, thus rounding out an excellent little handbook, on the

production of which both Dr. Thomson and the New Zealand Board of Science and Art are to be heartily congratulated.

CHARLES SCHUCHERT

YALE UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE USE OF NAPHTHALENE IN NARCOTIZING EARTHWORMS

THE preparation of earthworms for use in introductory courses in biology usually involves a more or less tiresome procedure of stupefying the animals with low grades of alcohol. In an effort to find some method which would shorten this procedure, experiments were made with a number of substances. Naphthalene in alcoholic solution gave excellent and uniform results.

A stock saturated solution of naphthalene in 95 per cent. alcohol was made up. Earthworms were gathered in the evening by the aid of a flashlight, during the months of May and June. Without preliminary washing the worms were placed in a dish of water, about one hundred specimens per liter. To each liter of water were added 40 cc of the stock naphthalene solution. Immediately the excess naphthalene was thrown out of solution as a curdy precipitate. This precipitate formed a stringy coagulum with the mucus secreted by the worms. In one hour or less the worms had become narcotized, so that pinching brought response only in an occasional worm. The animals were then washed entirely free of foreign matter. This process was not difficult, for the coagulum mentioned above did not adhere to the worms.

The specimens at this stage were found to be very flabby and wrinkled. They were laid, one by one, in fully extended condition, upon a dry paper towel in the bottom of a clean dish. All immature or injured individuals were discarded at this point. After some two or three hundred worms had been arranged on the towel, the latter was folded over and held in place, so that the position of each worm would not be disturbed while the following solution was poured on:

glacial acetic	10 cc
formalin	10 cc
copper sulphate	1 gm
water	1 liter

After a few hours in this solution the worms were found plump, fully expanded and well hardened. They were then transferred, without washing, to 95 per cent. alcohol for storage until needed.

Mixtures of alcohol and formalin may be used as storage solutions. In such solutions it is advisable to include a small quantity of copper sulphate. The bodies of worms as prepared for laboratory use contain a considerable amount of water, and this may dilute the alcohol to such a point that molds are likely to invade the solution and destroy the specimens. Molds which are able to live in fairly strong solutions of alcohol and formalin are unable to get a foothold in solution containing a very small quantity of copper sulphate. If this salt is present to the extent of one per cent., the tissues will be strongly colored. If this is deemed undesirable the amount may be greatly reduced without serious danger of invasion by molds.

It will be noted that acetic acid was a component of the hardening solution, but not of the storage solution. This reagent serves a valuable purpose in causing the worms to become plump and turgid before the formalin has had time to harden them. Long-continued treatment with solutions containing acetic acid has a tendency to make the body wall of the worm tender and therefore easily torn during dissection. Judging by the odor, it appears probable that the acetic acid carried over from the hardening solution to the storage solution combines with the alcohol of the latter to form ethyl acetate within a reasonably short time. This last compound does not appear to injure the tissues.

Comparative tests were made to determine the effects of naphthalene and of alcohol upon earthworms. Ten active worms were placed in a liter of water in each of two dishes. To dish A was added 40 cc of 95 per cent. alcohol; to dish B, 40 cc of saturated solution of naphthalene in 95 per cent. alcohol. At the end of three minutes the worms in dish A were active and writhing; in dish B they were performing peculiar movements as if tying themselves into knots. At the end of thirty minutes the worms in dish A were still active; those in dish B were quiet and moved only slightly after pinching. To test the depth of narcosis 5 cc of glacial acetic acid were added to each dish. The worms in dish A became very active immediately; those in dish B moved feebly. This experiment was repeatedly tried with uniform results. It appears clear that naphthalene has distinct powers as a narcotizing agent in the treatment of earthworms. Experiment demonstrated that worms showing slight movement after thirty minutes in the naphthalene solution, as used, could safely be placed in the hardening solution. The movements of the anterior ends were so feeble that in masses of closely compacted worms the anterior ends failed to get out of position to any serious extent.

This method has several attractive features. The naphthalene brings about narcosis in a relatively short