by comparing the embryos with the adults a good knowledge of the prosobranchiate fauna was obtained, with their breeding, resulting in the discovery that not one species has a pelagic larva, but all pass directly into the free bottom stage after they have reached a considerable size in their capsules. Alone of the twenty-eight Greenland molluscs noted (in twenty of which the breeding is described for the first time) *Acmaea rubella* was found to be viviparous and hermaphrodite.

The present paper deals with the egg capsules and enclosed embryos, their breeding seasons and habitats (very characteristic in most cases). The young in the capsules were identified by comparing the shell with the apex of the adult, which is very different from the rest of the shell and gives a perfectly good clue to the embryonic period. Whenever possible the size and shape of the capsules, description of embryos, duration of embryonic state and number of embryos in each capsule are given. In many cases, especially in the large species, there are nurse eggs. In *Siphocurtus* about eight hundred eggs are laid in each capsule, of which usually only two develop into shelled embryos which devour the others. It is found that the number of embryonic whorls in a species is not always constant, but depends upon the conditions of nourishment in the capsules, and the time of escape of the embryos depends on the amount of nourishment.

The fact that these arctic species have no pelagic larvæ is very important, especially when we compare closely related species from Britain and elsewhere, and find that many of these have distinct veliger larvæ which often stay in the plankton until several whorls are attained. With the larger forms such as *Buccinum* and *Neptunea*, the young emerge in the crawling stage in both Arctic and British waters, but the British turrids and the species of *Natica* and *Velutina* whose larvæ are known all have well-developed veligers which remain in the plankton for a considerable time.

The author does not in this paper make any suggestions as to the special conditions in these Arctic waters which apparently prevent any pelagic prosobranch larvæ from living. One anticipates with interest a discussion on these general problems.

Radio Research in Australia

IT is with considerable satisfaction that those responsible for the organization of radio research in Great Britain will note the continued activity of the Australian Radio Research Board as shown by the seventh Annual Report for the year ended June 30, 1935, recently issued by the Commonwealth Council for Scientific and Industrial Research[1]. Some of the papers published during the year under review have already been noticed (NATURE, **136**, 650; 1935) and further papers have just been issued in Report No. 9.

Investigations connected with the fading of radio signals and the transmission of waves through the ionosphere have been continued with the aid of fresh modes of attack and advances in technique. A new method of carrying out frequency-change emissions for the recording of interference fringes at the receiving station has been developed, involving the production and separation of modulation side-bands at the transmitter. It is pointed out that one of the methods of controlling the wireless signal variations, commonly known as fading, is to emit signals simultaneously on a number of adjacent carrier frequencies; and some preliminary experiments have been carried out to ascertain the possibilities of this technique as applied to radio-telephony circuits. In the field of atmospherics, observations of direction, wave form and intensity are being continued as a long-term investigation. Most of the evidence supports the now generally accepted view that every atmospheric originates in a storm centre and probably in an actual lightning flash. From the study of intensities of atmospherics from lightning at known distances, it has been estimated that the equivalent power of a lightning flash is about 2 kw. for a receiver tuned to 1,000 kc./sec. and with a band-width of 20 kc./sec.; the total peak radiated power is probably of the order of 100,000 kw. The application of the knowledge obtained in this work to interference with broadcast reception, to meteorology and particularly in reference to aircraft navigation at night, receives continuous consideration in Australia.

The Annual Report acknowledges the co-operation which the Radio Research Board has received from such institutions as the Postmaster General's Department, the Universities of Melbourne and Sydney, the Department of Defence, and the Commonwealth Solar Observatory and Meteorological Bureau. The Board also welcomes the indication of the way its staff is regarded by industry, given by the fact that two of its members have recently resigned to take up industrial appointments.

The other publication recently issued, No. 9 in the series of Reports of the Australian Radio Research Board[2], contains seven papers. The first two papers deal with the study of the magneto-ionic theory of wave-propagation. A graphical method to facilitate this study, worked out by Prof. V. A. Bailey, has been applied by Dr. D. F. Martyn to the calculation of dispersion, absorption and polarisation curves for five typical wave-lengths between 100 m. and 20,000 m.

In the third paper, Mr. J. H. Piddington describes an investigation of the causes of frequency variation of a dynatron valve oscillator, and indicates the manner in which such variations may be reduced. Two of the papers by Dr. G. Builder deal with certain aspects of circuit technique as applied to radio reception, while a third describes a useful and robust thermionic voltmeter having four ranges between 0–5 and 0–500 volts. The last paper in the Report is by Mr. Piddington, and this describes the principles and design of a novel form of harmonic analyser, which operates by suppressing the fundamental frequency and measuring the harmonics with a cathode ray tube outfit or a thermionic voltmeter.

[1] Reprinted from the *Journal* of the Council for Scientific and Industrial Research, Vol. 8, No. 4, November, 1935. (Melbourne: Government Printer.)

[2] Commonwealth of Australia: Council for Scientific and Industrial Research. Bulletin No. 95: Radio Research Board, Report No. 9. Pp. 71. (Melbourne: Government Printer, 1936.)

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