

species to specialize in particular species of fish. Flying fish *Exocoetus* spp. are commoner in the regurgitations of *S. sula* and *S. dactylatra* than of *S. nebovizi*.

Although *S. leucogaster* seems anomalous, rearing only one chick yet apparently showing a tendency to fish closer inshore than *S. dactylatra*, it is clear from Dorward<sup>5</sup> and others that this species suffers frequent and severe food shortage, which in effect favours the rearing of a single chick.

Although at first sight *S. bassana* seems to support the above relationship by invariably laying a single-egg clutch and also typically fishing at considerable distances from the breeding colony (up to 200 miles or even more), an experiment carried out in 1962 and 1965 on the Bass Rock showed that pairs given one extra young under controlled conditions fed both adequately and so gained a large reproductive advantage over their fellows<sup>6</sup>. Evidence gathered for *S. sula* and *S. dactylatra* showed that rearing young had no effect on the weight of the parents, which suggests that the normal clutch size is unlikely to impose such a strain on the parents that an addition would be highly detrimental. By inference this is likely to be true for *S. bassana*. If clutch size is mainly conditioned by the number of young that the parents can feed adequately<sup>7</sup>, *S. bassana*, on the above results, may have been expected to evolve at least a balanced polymorphism with respect to clutch size, the advantages of larger clutches perhaps being partly cancelled by their total failure in certain years. However, the British population of *S. bassana* is at present increasing rapidly and is therefore unstable with respect to its food supply. Also, the gannet's long life (annual adult mortality 6 per cent), deferred maturity and low reproductive rate lead to a slow population turnover and may mean that the one-egg clutch, which was presumably derived from the phylogenetically more primitive polyparous condition, has not yet had time to revert as an adaptation to a favourably changed environment.

The foregoing evidence and hypotheses may partly explain the otherwise puzzling variation in clutch size in a closely related, fish-eating family with basically similar plunge-diving feeding mechanisms.

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<sup>1</sup> Klutjver, H. N., *Ardea*, **39**, 1 (1951).

<sup>2</sup> Lack, D., *The Natural Regulation of Animal Numbers* (Oxford University Press, 1954).

<sup>3</sup> Wynne-Edwards, V. C., *Animal Dispersion in Relation to Social Behaviour* (Edinburgh, 1962).

<sup>4</sup> Murphy, R. C., *Oceanic Birds of South America* (New York, 1936).

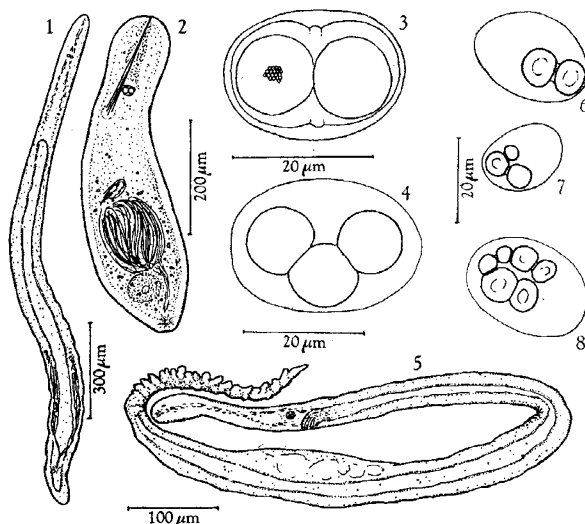
<sup>5</sup> Dorward, D. F., *Ibis*, **103b**, 174 (1962).

<sup>6</sup> Nelson, J. B., *Ibis*, **106**, 68 (1964).

### New Polyolithophorous Marine Turbellaria

IN 1930-31 Steinböck<sup>3</sup> described *Nemertoderma bathycola*, a peculiar new turbellarian from deep bottoms near Greenland. He considered the species to be rather primitive. A detailed investigation of a closely related if not identical form from the Scandinavian West Coast was published a few years later by Westblad<sup>7</sup>. In 1949 Westblad described *Meara stichopi* which is parasitic in ophiuroids<sup>8</sup>. These forms are characterized mainly by a statocyst carrying two statoliths (occasionally one, three or four<sup>1</sup>; Fig. 4), a neuropile and very primitive genital apparatus.

During recent investigations of the microfauna of some European coasts<sup>4-6</sup>, I found all the previously described Nemertodermatidae including (from deep bottoms off Bergen, Norway) Steinböck's original form. In addition, several undescribed species were encountered mainly from littoral sand. One of these (Figs. 1 and 3), an elongated form characterized by an intense salmon-red longitudinal stripe in the anterior part of the body, was found at Kristineberg on the west coast of Sweden. This species



Figs. 1-8. (1) *Nemertoderma* sp. I from the west coast of Sweden; (2) *Nemertoderma* sp. II from the Adriatic; (3) statocyst of *Nemertoderma* sp. I; (4) statocyst of an aberrant specimen of Westblad's *Nemertoderma*; (5) polyolithophorous turbellarian from the west coast of Sweden; (6-8) statocysts of three different specimens of the same as (5)

also occurs in the Adriatic in addition to a more compact species. The latter carries a rather strange broom-like organ of unknown function in the anterior region (Fig. 2). Some new forms, also undoubtedly related to *Nemertoderma*, have been recorded among R. Riedl's collections from the Red Sea<sup>2</sup>.

A still more interesting discovery, also in littoral sand from Kristineberg and the Adriatic, is the small elongated turbellarian shown in Figs. 5-8. Although it usually carries only a single statolith, specimens with two, three and even six statoliths have been found. The structure of the statocyst is reminiscent of the statocyst of the nemertean *Ototyphlonemertes*. Furthermore, the animal has a pharynx simplex and a ciliated intestine—characters usually associated with the Catenulida.

The strange characters of this polyolithic worm and the great variability of form, colour and glands in *Nemertoderma* lead to problems in the systematics of the new forms. Anatomical study of the material should reveal much additional data and a full account will follow.

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<sup>1</sup> Riedl, R., *Zool. Anz.*, **165**, (5/6) (1960).

<sup>2</sup> Riedl, R., *Zool. Jahrb., Abt. Syst.* (in the press).

<sup>3</sup> Steinböck, O., *Vidensk. Medd. Dansk. Natur. Foren.*, **90** (1930-31).

<sup>4</sup> Sterrer, W., *Ark. Zool.* (in the press).

<sup>5</sup> Sterrer, W., *Z. Morph. Ökol. Tiere*, **55** (1965).

<sup>6</sup> Sterrer, W., *Veröff. Inst. für Meeresforschung Bremerhaven* (in the press).

<sup>7</sup> Westblad, E., *Acta Soc. Fauna et Flora Fenn.*, **60** (1937).

<sup>8</sup> Westblad, E., *Ark. Zool.*, **1** (5) (1949).

### Carbohydrate and Amino-acid Composition of the Egg Capsule of the Whelk *Buccinum undatum* L.

THE characteristic monosaccharide sugar spectrum for glycoproteins of animal origin has, until comparatively recently, been regarded as being limited to the two hexosamines, glucosamine and galactosamine; the neutral hexoses, galactose, mannose and occasionally glucose; and the methyl pentose, fucose. One or other of the neuraminic acids is frequently present. The occurrence, in nature, of such monosaccharides as xylose, arabinose and rhamnose has hitherto been regarded as being confined to plants and micro-organisms. The presence, however, of xylose as a key constituent of acid-mucopolysaccharides<sup>1</sup>, and also accompanied by ribose, arabinose, galactose, mannose, fucose, glucosamine, galactosamine and sialic