

Transactions

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NUDIBRANCHIATE MOLLUSCA.

Dr A. SUTHERLAND, Invergordon, read a paper on 'the Nudibranchiate Mollusca of the Cromarty Firth.' The number of species of nudibranchs hitherto observed in the Cromarty Firth was he said 27 distributed among 8 genera as follows:—Doris, 6; Goniodoris, 1; Polycera, 3; Tritonia, 2; Doto, 2; Dendronotus, 1; Eolis, 11; Lima pontia, 1. As a whole the species are of a northern aspect, 21 being found in the littoral-laminarian zone, 15 are species of the coralline zone—(13 of this number ranging into the littoral, and two into the deep zone), and three are inhabitants of the deeper zones. The branchiate gastropods are arranged, according to the relation the heart bears to the efferent vessels of the branchiæ, into two orders. In one, the prosobranchiates, under which are grouped by far the greater part of the vast assemblage of univalve water-breathing mollusks, such as the whelk, the cowry, and the limpet, the branchiæ are in front of the heart; in the other, represented by the sea-hare and sea-slug, the branchiæ are situated posteriorly, hence the members of this order are styled opisthobranchiate. This latter order is sub-divided into those mollusks that have branchiæ more or less covered by a shell or mantle—the tectibranchs like *bulia* and *pleurobranchus*, and into those that have the breathing organs exposed, variously arranged on the back and sides. These last are the nudibranchs, the subject of the following remarks, which shall be confined to a few of the more interesting points in their structure and history. They are popularly known by the name of sea-slugs, a name sufficiently descriptive, for, notwithstanding their variety of form and brilliancy of colour, and although many of them are in some respects on a much lower platform of differentiation, they are essentially slugs adapted for respiration in water. They are, as far as yet known, all marine. As the name of the sub-order indicates, the peculiarity of their breathing apparatus is one of the most striking facts in their economy, their branchiæ being naked processes of the integument arranged symmetrically on the back and sides.

Nudibranchs are found all over the world, and are abundant round our coasts, especially where the bottom is hard. Their habits can be easily studied, as they bear confinement very well, especially the littoral species. They are beautiful and interesting objects for aquarium

purposes—easily obtainable and easily kept alive, for although they are chiefly zoophagous and often voraciously so, they can live for weeks without any visible food. The study of their development is one of the most interesting chapters of zoology. The spawn is deposited in the form of a transparent ribbon or flattened tube of a firm gelatinous consistency attached generally in spiral coils by one of its borders to stone, seaweed, or polypary, and containing many thousands of eggs. Owing to the transparency of the ova and their gelatinous envelope, the changes the embryo undergoes up to the time the larva leaves the shell are easily observable. Having passed through the stages known as *morula* and *gastrula*, the fully developed larva, about the size of a small pin's head, is hatched, not as a slow, creeping, naked gastropod, but as a free swimming, very active rotifer—like an animal furnished with a calcareous nautiloid shell, a two lobed ciliated velum for the purpose of locomotion, and a large operculum by which it can when retracted close the mouth of the shell. The larva can be observed rapidly rotating within the egg capsule some days before leaving it. The developmental stages anterior to the emersion of the larva are well known, and seem to be much the same in all the order, but how the shelled veligerous larva, which shows no signs of the internal arrangements or external organs of the adult, becomes changed into the nudibranch has not been satisfactorily observed. The difficulties in the way of determining the origin of the different organs have hitherto, to a great extent, baffled the patience and skill of our embryologists.

List of Nudibranchs from the Cromarty Firth.

1. *Doris tuberculata*, Cuvier. This is a common species between tide-marks, but seems to be most abundant somewhat beyond this range. The logs of the jetty at Invergordon are a favourite locality for it, where it and, from February to July, the beautiful spawn-ribbon can be conveniently obtained.

2. *Doris Johnstoni*, Alder & Hancock.

3. *Doris repanda*, Alder & Hancock.

4. *Doris aspera*, Alder & Hancock.

5. *Doris bilamellata*, Linné. This is the most common species of *doris* in the Firth, and one of the most interesting. From its abundance and the ease with which it can be kept in good health in confinement, it gives excellent opportunities for studying nudibranchiate life. It is gregarious, and seems to have the social instinct highly developed. I have observed them in spring during the spawning season occur in groups of 30 and 40, high up among the stones in upper third of the littoral zone. Besides their social habits making them congregate in numbers in their rookeries, the specimens I kept for months showed a distinct appreciation of locality and direction. The large and small varieties occur in the Firth.

6. *Doris pilosa*, Müller. Very common on stones and fuci in the littoral zone, of all colours, 'from pure white to yellowish white, canary yellow, yellowish brown, gray, purple, brown, and black.' Spawn in October.

7. *Goniodoris nodosa*, Montagu.

8. *Polycera quadrilincata*, Müller. One of the commonest species between tide-marks on laminaria and fucus during the autumn months. It is a lively and beautiful object in the aquarium.

9. *Polycera lessoni*, D'Orbigny.

10. *Polycera ocellata*, Alder & Hancock.

11. *Tritonia Hombergi*, Cuvier.

12. *Tritonia plebeia*, Johnston.

13. *Dendronotus arborescens*, Müller.

14. *Doto coronata*, Gmelin. Very common. Found in all zones of depth. In the summer months the most common of all, occurring in immense numbers along with the spawn on Fuci. When put into water in a glass jar, they seek the side next the light. They may often be seen (as all the nudibranchs seem capable of doing) swimming from the surface of the water in a reversed position, or hanging from it at any depth by an invisible thread of transparent mucus.

15. *Doto fragilis*, Forbes.

16. *Eolis papillosa*, Linné.

17. *Eolis coronata*, Forbes. This splendidly coloured species is common in the littoral and laminarian zones, especially in the autumn months.

18. *Eolis Drammondi*, Thompson. Abundant with spawn in October, especially on the bunches of *Tubularia gracilis* growing on the jetty logs. One specimen measured upwards of two inches.

19. *Eolis rufibranchialis*, Johnston.

20. *Eolis alba*, Alder & Hancock.

21. *Eolis olivacea*, Alder & Hancock.

22. *Eolis angulata*, Alder & Hancock.

23. *Eolis aurantiaca*, Alder & Hancock.

24. *Eolis tricolor*, Forbes.

25. *Eolis faranni*, Alder & Hancock.

26. *Eolis exigua*, Alder & Hancock.

27. *Limapontia nigra*, Johnston.

A paper was next to have been read by Dr Struthers, Professor of Anatomy, Aberdeen, its subject being 'Some Anatomical Evidence of the Antiquity of Man,' with diagrams. Dr Struthers was, however, unable to be present, the University examinations this year taking place at a later date than usual. The Secretary read a letter from the Professor expressing great regret that circumstances detained him in Aberdeen.

Mr Spence here also intimated apologies for absence from Professor Trail, Aberdeen, and Dr Ogilvie-Forbes of Boyndlie; from the secretaries of the Edinburgh Naturalists' Field Club, the Kirkcaldy Naturalists' Society, and the Largo Field Naturalists' Society, &c.