grooves extending to the edge of the foot, these grooves being opposite to each other at their origin.

As I believe the animal has not yet had a name applied to it, I would suggest that it should be called, in recollection of the island where it was first discovered, and also of its first discoverer, *Aneitea Macdonaldii*; and the observations above given will form its generic character. In other characters it agrees with *Limax*.

I may add that the description and figures of the tongue and teeth of *Janella* given in the interesting paper of Mr. Knight show that *Janella* forms a most distinct family of terrestrial Mollusks.

Mr. Knight observes that he has termed the covering of the whole upper surface of *Janella* "the mantle," in deference to my views; but he thinks that it ought "more probably to be regarded as quite *naked*." The study of the genus *Aneitea* and the examination of Mr. Knight's paper have induced me to change my views. I now believe that the mantle is confined to the upper surface of the small respiratory cavity of both these animals; and this is confirmed by Mr. Knight having discovered "four small semitransparent calcareous (?) granules in the anterior wall of the pulmonary sac," showing that this part must be a "secretory organ;" but I do not understand how animals having such plates can be "regarded as quite naked."

XXIX.—*On the Nudibranchiate Mollusca inhabiting the Estuary of the Dee.* By Cuthbert Collingwood, M.B., F.L.S. &c.*

In a former paper I described the species of Nudibranchiata which up to that time had become known to me as inhabiting the estuary of the Mersey; I propose in the present communication to make some remarks upon those which are found in the neighbouring estuary of the Dee. I will not here dwell upon the species which are common to both rivers, having already made special reference to them as existing in the Mersey, while the table at the end of this article will sufficiently indicate their comparative rarity or profusion in both situations. The Mersey species which have not hitherto been detected in the Dee are *Embletonia pallida*, peculiar to the Mersey, and *Eolis concinna* and *E. despecta*. Of these, *Embletonia* has not been taken for some years; and it is to be feared that the locality in which Mr. Price first discovered it has been destroyed by the formation of the Birkenhead Docks. During the past spring, I have found a third small species of *Eolis* in the Mersey at Egremont, in com-

* Communicated by the author, having been read before the British Association at its Meeting at Oxford (1860).

pany with *E. concinna* and *E. despecta*: this is *E. exigua*, which inhabits the same fronds of *Laomedea gelatinosa* as the other two, being found in rock-pools considerably above low-water mark; but it appears to be much less numerous than *E. despecta*. There are thus four species existing in the Mersey which have not hitherto been met with in the Dee; and it will presently appear that the Dee possesses five species which have not yet made their appearance in the Mersey. The *Polycera Lessonii*, recorded as dredged off the Mersey, was taken about midway between the two estuaries, and can hardly be claimed, therefore, as the especial property of either.

Among those species common to both estuaries, one, however, deserves especial mention, viz. *Doris proxima*, from the fact that although found both in the Mersey and Dee, I am not aware of its having been taken anywhere else. In external characters it closely resembles *D. aspera*; but it is not a little remarkable that *D. aspera* has not yet been detected on these shores. I have searched in vain for it myself, nor can I hear that any one else has taken it*. It appears to be *replaced* by its ally *D. proxima*. This fact would lead one to suppose it to be a mere local variety, were it not that the tongue differs so widely in the two species that Mr. Alder remarks, "some naturalists might be disposed to consider them generically distinct."

I had the satisfaction of adding to the local list, in the autumn of 1859, *Eolis rufibranchialis*, characterized as one of the most slender and delicate forms of the genus. This beautiful species I first met with in July, at Hilbre Island, in the Dee, where it was of large size, and in some numbers. Visiting the Egremont shore of the Mersey in March of the present year, I was surprised to find as many as two dozen specimens of this brilliant creature where I had never seen it before. They were very brightly coloured, but not so large as the examples taken in the Dee.

The hunting-ground for these little animals in the estuary of the Dee is of very limited extent. On the Cheshire side, long before the time of low water, the tide runs out, leaving a vast and bare expanse of sand, most unproductive of animal life. The river is six miles wide at its mouth; and with the Welsh side I am unacquainted, owing to its distance and inaccessibility. But about a mile and a half from Hoylake, at the north-west angle of the Cheshire shore, commences a ridge of New Red Sandstone, nearly parallel with the coast, extending up the river

* In a note now before me, from Mr. Price, he says, "Every *Doris* (*aspera*) I ever suspected and sent to Mr. Alder, he pronounced to be *D. proxima*. They were sometimes pure white; their spawn dull yellow and inconspicuous, forming a squarish spiral."

for about a mile and a half, and rising at intervals into three small islands, called respectively Hilbre, Middle Island, and Little Eye. Hilbre is the largest and most seaward of these; nevertheless at low water three sides of it are left uncovered by the tide, and it is only a portion of the north-western side which is sufficiently steep and rocky to harbour marine animals. The other two islands are left high and dry at low water. Two miles higher up the river are some rocky prominences named Caldy Blacks, which are seldom visited, partly from their distance, and partly because the tide rushes up the Dawpool Deeps so rapidly and so insidiously, that, without great caution and some experience, the visit is not unattended with danger. Still it is necessary that these rocks should be mentioned, because at least one Nudibranch of rarity and interest has been obtained there. It is the north-west corner of Hilbre Island, however, which is the el Dorado of Liverpool marine zoologists; and it is really, for its extent, a spot of singular richness, but at the same time sufficiently difficult of access to render a visit to it an event of interest and importance. The low-water mark is fringed with a conspicuous belt of *Alcyonium digitatum*, interspersed with numerous specimens of *Sagartia sphyrodeta* (Gosse) and *Actinoloba dianthus*, with here and there an individual of *Sagartia viduata*; while immense and beautifully coloured *S. crassicornes* are clustered in masses higher up the rock, together with the ever-varying tints of the little *S. troglodytes*. Elsewhere the rocks are encrusted with sponges, such as *Halichondria panicea* and *H. oculata*; and in the little rock-pools are abundance of Polyzoa and Zoophytes, such as the delicate *Crisia eburnea* and the screw-like *Bugula avicularia* among the former, and *Laomedea gelatinosa*, *Sertulariæ*, *Campanulariæ*, and *Plumulariæ* &c. among the latter, mingled with the flower-like clusters of *Tubularia indivisa*. Beneath nearly every stone may be found numbers of brittle-stars (*Ophiocoma rosula* and *O. texturata*), which harbour there with the two species of Porcelain Crabs, *Porcellana platycheles* and *P. longicornis*, particularly the latter, and various species of *Terebella*, *Nereis*, and *Phyllodoce*. In other spots are thickly-planted colonies of the beautiful Fan-Amphitrite (*A. ventilabrum*), whose variegated and spiral gills often measure as much as $2\frac{1}{2}$ inches across. Besides the Crustacea just referred to, there are always to be met with *Stenorhynchus phalangium*, *Hyas araneus*, *Cancer pagurus*, *Portunus depurator*, abundance of Hermits (*Pagurus Bernhardus* and other species) inhabiting shells which vary in size from the largest *Buccinum* and *Fusus* to the smallest *Mangelia*, the Æsop Prawn (*Pandalus annulicornis*), and a number of minute Crustaceans, such as *Nymphon gracile*, *Pycnogonum littorale*, *Lygia*, &c., while every weed is alive with

the grotesque bowing forms of *Caprella Phasma* and *C. linearis*. In addition to this host of animals, the rocks are occupied with an abundance of boring Mollusks, particularly *Pholas crispata*, with here and there specimens of *Saxicava arctica*; and their slippery surfaces afford to the special searcher several Tunicates, such as *Ascidia*, *Clavellina*, and *Botryllus*; while *Tapes pullastra*, *Chiton cinereus*, *Trochus cinerarius*, *Purpura*, and *Buccinum* are among the shelled Mollusks, as well as occasionally some less common. Even fish are sometimes entangled in the pools, and may be taken by the hand, such, for instance, as the Spotted Gunnell (*Murænoides guttata*), and the Three-bearded Rockling (*Motella vulgaris*) frequently, and occasionally the Father Lasher (*Cottus bubalis*), the Black Goby (*Gobius niger*), the Fifteen-spined Stickleback (*Gasterosteus spinachia*), and the Power Cod (*Morrhua minuta*).

Such is the hunting-ground at Hilbre Island; and when it is borne in mind that all these and many more, and often rarer, animals are found in a space which might be traversed from end to end, but for the impeding rocks, in five minutes, it will be conceded that it is a singularly rich locality. Moreover, I have not yet alluded in this sketch to that tribe which is the especial subject of this paper (the Nudibranchiata), of which no less than twenty-two species have been found in this contracted spot, some of them being of the highest rarity and interest.

The second known specimen of the exquisite *Eolis Landsburgii* was taken by my friend Mr. Byerley at Hilbre Island in 1849. In August 1859 I met with a specimen at the same spot, having, as previously stated, found it in the Mersey in April of the same year.

Tritonia Hombergii is more frequently met with at Hilbre Island than in any part of the Mersey; indeed, although considered a deep-sea species, the island is seldom visited without a specimen being taken. I refer to it particularly here, because in August 1859, Mr. Moore the curator of the Liverpool Museum, visiting the spot, brought home a pure white specimen, a very beautiful and extremely rare variety. Mentioning the circumstance to Mr. Alder, he writes, "We have got *Tritonia Hombergii* nearly colourless, but not pure white; generally a little inclined to flesh-colour." That this was not a mere sickly individual, is proved by the remarkable fact that it, together with some specimens of *Eolis papillosa*, which were taken at the same time, lived under Mr. Moore's care for four months. It is generally difficult to keep the Nudibranchiata alive in confinement for more than a week or two, or at most a month; and indeed, if placed in an aquarium, the larger species at least usually perish in a few days. The secret of the present success lies, I think,

in the fact that these specimens were placed in a shallow glass dish, and in a situation constantly exposed to draughts of fresh air, which kept the water well aërated.

The five species of Nudibranchiata which have been met with in the Dee only, and not in the Mersey, are the following:—

1. *Doris depressa.* This scarce little Doris, remarkable for the great relative size of the spicula, was once taken by Mr. Byerley at Hilbre Island.

2. *Doris subquadrata.* Only two specimens of this rare Doris appear to have been yet seen. The first was discovered by Mr. Alder, in deepish water at Torbay, in 1845; and the second was found by Mr. Byerley at Caldy Blacks, in the Dee. This specimen was forwarded to Mr. Alder, who confirmed the fact of its being *D. subquadrata.* I believe it has never been taken since. It was in company with *Doris pilosa,* to which species it is closely allied, but yet differs from it in several points, and particularly in the degree of development of the pallium, which in *D. subquadrata* is so scant as to leave the head and posterior part of the foot uncovered, when the animal is extended.

3. The third peculiar Dee species is the *Eolis olivacea.* The last excursion of the Liverpool Naturalists' Field Club was to Hilbre Island, on which occasion, notwithstanding that the day was hopelessly wet, it was not sufficiently so to damp the ardour of ninety-five members and friends of this flourishing Club. A few only landed; but among the captures I was glad to number *Clavellina lepadiformis,* new to our local list of Tunicata, while, among some Zoophytes brought from the island by Dr. Edwards, there appeared a specimen of the above *Eolis* not hitherto known in this locality. It was a small specimen, very brilliantly coloured, and altogether a very elegant addition to our fauna.

4 & 5. But the most interesting genus of all is perhaps that to which the remaining two species belong. I refer to *Antiopa,* the history of which is not a little remarkable. In 1844, M. Verany of Genoa described a species of Nudibranch inhabiting the shores of Southern Europe, under the name of *Janus Spinolæ.* The name *Janus,* however, having been already occupied by a genus of Hymenopterous insects, Messrs. Alder and Hancock proposed to call it *Antiopa,* in order to avoid confusion of generic terms. The animal in question appeared to approach very near in its characters to *Proctonotus mucroniferus*; but a remarkable crest between the dorsal tentacles, added to the lamellated form of the tentacles, and the terminal branching of the biliary cells of the papillæ, appeared to warrant its separation from the genus *Proctonotus*; and for seven years it constituted the sole species of the genus, under the name of *Antiopa splen-*

dida; and perhaps it is one of the most beautiful of this beautiful tribe. It inhabits the Mediterranean Sea, the south coasts of Europe and England,—the Menai Straits being the only northern locality known when the Ray Monograph was published. In July 1851, however, my friends Messrs. Byerley and Price, when on a visit to Hilbre Island, each picked up a specimen of a new species of *Antiopa* possessing the crest of that genus, but in the tuberculated papillæ approaching still more closely to *Proctonotus* than did the first *Antiopa*. One of these was sent to Mr. Alder, but died before it reached him; still, being a unique specimen, it was figured, and appeared in the Monograph under these adverse circumstances. Much as it resembled *Proctonotus*, the crest was with reason considered sufficient to distinguish it, and it was described under the name of *Antiopa hyalina*, the original species having in the mean time been renamed *A. cristata*—as I think, unfortunately, since the crest constituted a generic, and not a specific distinction. In August 1854 Mr. Byerley again met with a specimen of *Antiopa hyalina* within a few yards of the original spot. This was the first Mr. Alder saw alive, and it was a much superior specimen, more mature, and in altogether better condition than that figured, from which it differed in the greater length and more pointed character of the dorsal tentacles, the superior attenuation of the papillæ, and greater length of the tail. A careful drawing of it was made by Mr. Hancock, but too late to replace the one engraved for the Monograph.

This remarkably local species has hitherto eluded search in every other spot, and is peculiar to Hilbre Island in the Dee; and there, until the summer of 1859, it was the sole representative of the genus. In July of that year, however, I was so fortunate as to discover some fine specimens of *Antiopa splendida* (or *cristata*). These were such beautiful objects that I sent the largest to Mr. Alder, who informed me that even finer specimens occur in the Mediterranean. I look upon it, however, as the most lovely of the tribe, but one which has met with scant justice in that, for the most part, exquisitely-illustrated work. But it would perhaps be scarcely possible to delineate it satisfactorily: it deserves the name of *hyalina* even more than its congener. Mr. Moore, who visited Hilbre about a month after I had discovered *Antiopa cristata*, and who was with me on that occasion, upon looking into the rock-pool in which I had found them, saw an individual of that species, and, with it, one with which he was not familiar. He brought it to Liverpool; and on examination, it turned out to be another specimen of *Antiopa hyalina*. Thus this rare Nudibranch has been taken in the

same spot at intervals of three and five years, and at last in company with its congener, exhibiting the curious and interesting spectacle of a small rock-pool containing an entire genus, the species of which are—one a widely-distributed animal, whose geographical range extends from there to the Mediterranean Sea, the other apparently one of the most localized animals upon the face of the earth.

The value of local lists is now fully recognized; and although they can never be deemed perfect, inasmuch as enlarged research and process of time may always be expected to bring to light additional species, nevertheless the collection of such carefully prepared lists is undoubtedly the best means of illustrating the Fauna of a country, as well as of elucidating the geographical range and distribution of animals. The following Catalogue of the Nudibranchiate Mollusca of the Mersey and Dee may be regarded as accurate and complete up to the present time.

Catalogue of the Nudibranchiata of the Mersey and Dee.

1. *Doris tuberculata.* Mersey and Dee; common.
2. —— *Johnstoni.* Mersey and Dee; once or twice.
3. —— *proxima.* Mersey and Dee; common (found nowhere else).
4. —— *bilamellata.* Mersey and Dee; abundant.
5. —— *pilosa.* Mersey and Dee; not uncommon.
6. —— *subquadrata.* Dee; once (the second known specimen).
7. —— *depressa.* Dee; once.
8. *Polycera Lessonii.* Between Mersey and Dee; once.
9. —— *ocellata.* Mersey and Dee; occasional.
10. *Ancula cristata.* Mersey and Dee; common.
11. *Tritonia Hombergii.* Mersey and Dee; occasional.
12. —— *plebeia.* Mersey and Dee; occasional.
13. *Dendronotus arborescens.* Mersey and Dee; common.
14. *Doto coronata.* Mersey and Dee; very common.
15. *Eolis papillosa.* Mersey and Dee; common.
16. —— *coronata.* Mersey and Dee; common.
17. —— *Drummondi.* Mersey and Dee; very common.
18. —— *rufibranchialis.* Mersey and Dee; not uncommon.
19. —— *Landsburgii.* Mersey and Dee; rare.
20. —— *concinna.* Mersey; common (the second known locality).
21. —— *olivacea.* Dee; once taken.
22. —— *aurantiaca.* Mersey and Dee; common.
23. —— *picta.* Mersey and Dee; not uncommon.
24. —— *exigua.* Mersey; apparently rare.
25. —— *despecta.* Mersey; common.
26. *Embletonia pallida.* Mersey (the only known locality); very rare.
27. *Antiopa cristata.* Dee; occasional.
28. *Antiopa hyalina.* Dee (the only known locality); very rare.

15 Oxford St., Liverpool,
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