

Preliminary Account of some New-Zealand Actiniaria.

By H. FARQUHAR.*

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(PLATE 36.)

A FEW years back I began to collect Sea-anemones and make notes on their habits and distribution, and I had hoped before this to have prepared full descriptions with sectional figures of the species found in the neighbourhood of Wellington. Circumstances, however, have prevented me doing so up to the present; and as it may be some time before I am able to prepare a full report, I give here a preliminary account of a few of the species the position of which I have been able to determine with certainty.

It is evident that we have here in New Zealand a rich and extremely interesting Actiniarian fauna. The species appear to be all endemic, while the genera are for the most part widely diffused, and I may mention here one or two points which seem to me to present themselves for investigation. The species known to me appear to fall naturally into three classes as to their geographical distribution:—(1) Species which are extremely abundant at the stations where they occur, but confined to a very limited area of distribution, such as *Actinia tenebrosa*, and probably *Halcampactis mirabilis*, *Corynactis Haddoni*, and *Corynactis mollis*; (2) species which are abundant at the stations where they occur and have a comparatively large area of distribution, such as *Anemonia olivacea*, Hutton, *Phymactis inconspicua*, Hutton, and *Gregoria albocinctus*, Hutton; (3) species which are not abundant at the stations where they occur, but which have a comparatively wide area of distribution, such as *Oulactis plicatus*, Hutton, and *Actinia? Thomsoni* †, Coughtrey. A great deal of work will have to be done before it can even be

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† This species, which is not uncommon in the neighbourhood of Wellington, does not belong to the genus *Actinia*. It will probably form the type of a new genus of the family Anthedæ, having a weak sphincter muscle, no marginal spherules, the body-wall smooth and divided into two parts, scapus and capitulum. It was described by Dr. Coughtrey in the Trans. N. Z. Inst. vol. vii. p. 280. Descriptions of Professor Hutton's species mentioned above may be found in the Trans. N. Z. Inst. vol. xi. p. 311.

decided whether what I have observed in regard to the distribution of the Actinians in the neighbourhood of Wellington obtains throughout New Zealand. If it be so, the explanation may possibly be found in the mode of reproduction of the several species. In some species the young are retained in the body of the parent till metamorphosis has taken place. In others it may be that some of the young are developed within the parent, while others are liberated when they are free-swimming, ciliated embryos. And in other species the young may all be liberated in the form of free-swimming embryos, when they are widely dispersed by the currents, and thus these last are never found in great abundance at any one particular station.

There appear to be two distinct littoral marine faunas in New Zealand—a northern and a southern. Mr. H. B. Kirk, who, as Inspector of Native Schools, often travels around our coasts from the North Cape to Stewart Island, informs me that the assemblage of marine animals to the north of East Cape presents a striking difference to that on our southern shores—the Actinian faunas being especially distinct.

The new species *Halca pactis mirabilis* is an exceedingly interesting form, since by its strange combination of characters it forms a link between the two families *Sagartidæ* and *Halcampidæ*, which have hitherto been widely separated by systematists.

I desire to express my thanks to Professor Hutton and Mr. H. B. Kirk for their kind assistance.

EDWARDSIA ELEGANS, n. sp. (Pl. 36. figs. 1, 2.)

Body long and vermiform, very variable, usually clavate, divided into physa, scapus, and capitulum. Physa spherical, small, smooth, and delicate, completely retractile, without a terminal pore, but furnished with minute suckers. Scapus in three distinct parts—the lower third is covered with a rough epidermis, then follows a part, occupying nearly two-thirds of the scapus, clothed with very thin, smooth epidermis, succeeded by a short length without epidermis, smooth, delicate and barrel-shaped when expanded. Body-wall transversely wrinkled when contracted, traversed by eight shallow, indistinct, longitudinal grooves, except on the lower rough part, where they cannot be seen. Capitulum short, smooth, and delicate. Not only the disc and capitulum but also the naked part of the scapus, and the part below this clothed with smooth epidermis, are retractile.

Tentacles long, thin, cylindrical, pointed, equal, bicyclic, 16 (8+8). Mouth elongate, raised on a prominent cone. Œsophagus strongly ribbed. Physa pellucid white. The lower rough part of the scapus rather dull chestnut-brown, the part clothed with smooth epidermis pale yellowish orange, and the naked part transparent pale reddish orange, with eight fine, double, longitudinal, bright red lines. Capitulum madder-brown or orange, with eight opaque white lenticular figures, which alternate with eight longitudinal, double, white lines. Tentacles pellucid white, tipped with opaque yellowish white. Disc pale madder-brown, with eight radiating white lines, and white round the bases of the tentacles. Œsophagus orange or white. Length of body expanded about 75 mm.; length of capitulum 3 mm., diameter of capitulum 2.4 mm.; length of tentacles 6 mm.

Hab. Cook Strait, in the neighbourhood of Wellington; not uncommon on the undersides of stones, just below low-water mark.

The first specimen of this beautiful species was placed in my hands by Mr. H. B. Kirk, 25th May, 1894.

EDWARDSIA NEOZELANICA, n. sp. (Pl. 36. fig. 3.)

Body long and vermiform, very variable; divided into three distinct parts, physa, scapus, and capitulum. Physa rather large, exceeding the scapus in diameter, bladder-like, furnished with exceedingly minute suckers, retractile. Scapus long and cylindrical, invested with a very thin, rather rough epidermis, except a very short length above, which is naked; traversed by eight shallow, longitudinal furrows, which correspond to the insertions of the mesenteries. Capitulum short, delicate, and smooth. Tentacles very thin, long, cylindrical, equal, pointed, bicyclic, 16 to 24 (usually 16), the tips usually recurved. Disc, capitulum, and upper part of scapus retractile. Length of body expanded about 43 mm.; diameter of physa 3.2 mm.; diameter of scapus 2.5 mm.; length of tentacles 3.7 mm. Physa pellucid white, with eight opaque white longitudinal lines. Scapus very pale transparent orange, becoming buff or bright orange near the capitulum, traversed by eight whitish longitudinal lines. Capitulum, disc, and tentacles uniform pellucid white or pinkish white, without any markings.

Hab. Lyall Bay and Ohiro Bay, on the undersides of stones and roots of *Lessonia*; fairly abundant.

HALCAMPACTIS, n. g.

Hexamerous actinians with acontia; aboral end of the body rounded, without pedal disc; body divided into three parts, capitulum, scapus, and physa; capitulum retractile; body furnished with suckers; no sharply-defined circular muscle; six pairs of strongly-developed, perfect mesenteries; secondary mesenteries probably always present; tentacles few, conico-cylindrical.

HALCAMPACTIS MIRABILIS, n. sp. (Pl. 36. figs. 4-6.)

Body cylindro-clavate, exceedingly variable, divided into capitulum, scapus, and physa; body-wall smooth in expansion, transversely and longitudinally wrinkled when contracted; studded with exceedingly minute suckers. Disc flat, with slight corrugations from the bases of the inner tentacles to the mouth; radii distinct. Mouth linear, not prominent, but often gaping. Throat strongly ribbed. Tentacles cylindrical, with rounded extremities, bicyclic, 24 (12+12), those within slightly larger than those without, often recurved in extension. Acontia emitted rarely, and by the mouth only. Scapus and physa brownish red or yellowish red, rarely dusky brown; capitulum pale yellow or crimson. Disc buff or pale yellow, with twelve patches of madder-brown round the mouth between the radii, and sometimes sulphur-yellow spots near the bases of the tentacles. Tentacles pale yellow, with four or five dark brown or sulphur-yellow spots formed by pigment-cells which line the interior tube; when the tentacles are partly contracted, this colour appears to line the whole interior. Œsophagus rich orange. Length of physa and scapus together about 26 mm.; diameter of physa 7 mm.; diameter of scapus about 4 mm.; length of capitulum 2 mm.; diameter of disc 4.5 mm.; length of tentacles 3 mm.

Hab. Ohiro Bay and adjacent coast, near Wellington; on roots of *Lessonia* and undersides of stones, below low-water mark; abundant.

This species has no well-defined line between the scapus and bladder-like physa; the capitulum, however, is better defined, being separated from the scapus by a slight constriction and usually by an irregular band of dark colour. A constriction

often passes down the body, when the aboral end assumes the appearance of a terminal orifice, though no such orifice really exists. So far as I can make out, there are no perforations in any part of the body-wall. The disc and capitulum can be completely and quickly invected, when the body becomes clavate or fusiform, with six prominent crest-like ridges above, the crenations between these corresponding with the insertions of the six pairs of perfect mesenteries. The tentacles are transversely wrinkled when contracted, and they can be reduced to mere wart-like processes. The six alternate tentacles of the inner cycle, which spring from the endocœles of the perfect mesenteries, are frequently more prominent than the other six which spring from the endocœles of the imperfect mesenteries, being held more forward and upright. The tentacles of the outer cycle spring from the exocœles. The body is clothed with a thin, rough, greyish cuticle, which is thrown off in captivity. The acontia consist of a tough, transparent, homogeneous, fine, thread-like axial band surrounded by granular tissue composed of ciliated cells, among which the nematocysts lie packed closely together with their outer ends slightly directed towards the free end of acontia. The acontia are 0.1 mm. in diameter, and the nematocysts of the acontia 0.072 mm. in length. When the body-wall is ruptured the long, white, thread-like acontia (with free ends) stream forth freely. The nematocysts are then discharged and the axial band only withdrawn. Sections through the body show six pairs of perfect mesenteries (macrosepta) bearing strongly developed, circumscribed retractor muscles, characteristic of the *Halcampidæ*. Six pairs of imperfect mesenteries (microsepta) alternate with the six pairs of perfect mesenteries. The mesenteries and acontia can be clearly seen with a lens through the thin, transparent body-wall of an expanded individual.

I am indebted to my friend Mr. H. B. Kirk for the first specimens of this extremely interesting little species. Two very fine specimens were discovered by him at Ohiro Bay, while collecting calcareous sponges, and were placed in my hands 26th Sept., 1893. One of these was conspicuous in having a beautiful bright crimson capitulum, the colour shading off on the scapus.

The young of this species are not parasitic like the young of *Halcampa*. I have often found full-grown individuals with

numerous young ones grouped around them, evidently as they had attached themselves round the parent when born.

CORYNACTIS HADDONI, n. sp.

Base exceeding the column, often widely extended, sometimes with an irregular wavy margin. Column exceedingly variable, cylindrical or pillar-shaped, often contracted in the middle, sometimes vase-shaped; surface smooth, without papillæ and without suckers; transversely wrinkled when contracted; substance firmly fleshy. Disc often greatly exceeding the column, circular, usually concave in expansion, the edge of the disc and the peripheral tentacles overhanging the column; radii distinct. Mouth linear, prominent, sometimes assuming a circular conical form. Œsophagus strongly ribbed. Tentacles in two series: a series of marginal principal tentacles, and a series of intermediate accessory tentacles. The principal tentacles are arranged in two cycles, with about 40 in each cycle. All the tentacles of the same cycle are equal to one another; those of the inner cycle when fully extended are about three times as long as those of the outer cycle. The short principal tentacles on the periphery of the disc alternate with the longer ones within, and form radial series with the intermediate accessory tentacles. Each radial series consists of a principal tentacle on the periphery of the disc and from two to four accessory intermediate tentacles. These radial series of tentacles correspond to alternate mesenterial chambers, apparently the exocoelæ. The tentacles forming radial series decrease in size from without inwards. The shafts of the tentacles are cylindrical, tapering, with a narrow smooth neck just below the knob, succeeded by a region covered with minute ridges and papillæ, becoming smooth again at the base. In contraction the tentacles are transversely wrinkled. The knobs of the tentacles are very rich in nematocysts, adhering to anything with which they may come into contact. Although not very sensitive the tentacles can be completely retracted, the sphincter muscle evidently being fairly well developed. The colour of this species is very variable. I have been able to distinguish the following seven varieties:—

(1) Column deep reddish orange, passing into chocolate-brown above, frequently with a greyish or brownish-grey tinge near the base. Disc deep madder- or chocolate-brown, with an undefined purplish band about halfway between the mouth and

the periphery of the disc. The disc is variegated with irregular patches of opaque white, sometimes with a bluish tinge. Œsophagus reddish orange. The long primary tentacles brown, becoming transparent at the base; all the other tentacles pellucid white below, and brown or yellowish brown above; knobs of all the tentacles brown. Abundant.

(2) Column lemon-yellow, passing into white or pinkish white below, with fine opaque white vertical lines, which mark the insertions of the mesenteries. Disc lemon-yellow, sometimes with a greenish tinge towards the periphery. Tentacles pale yellowish pink. Rare.

(3) The whole animal a beautiful, uniform rose-pink; sometimes the tentacles are white. Not uncommon.

(4) Column brownish pink, passing into light crimson above. Disc pale pink or very pale crimson. Principal tentacles brown with purple knobs; accessory tentacles white below, passing into brown above, and white knobs, sometimes with a purplish tinge. Rare.

(5) Column pellucid white, with a pale pinkish tinge below; fine opaque white lines mark the insertions of the mesenteries. Disc beautiful pellucid pale sea-green. Tentacles pellucid white with a faint pinkish tinge. Very rare.

(6) Column madder-brown, darker above. Disc pale madder-brown. Shafts of tentacles light brown below, becoming deep chocolate-brown above, knobs white; œsophagus orange. Not uncommon.

(7) Column chocolate-brown. Disc dark chocolate-brown near the margin, and bright green between the tentacles and the mouth. Shafts of principal tentacles brown, with a white band round the base, knobs pale crimson. Uncommon.

The height of this species is about 20 mm.; diameter of column about 6 mm.; diameter of disc 12 mm.; diameter of base about 10 mm.; length of longest tentacles 5 mm.

Hab. Lyall Bay, Island Bay, and Ohiro Bay, on rocks just below low-water mark.

This exceedingly beautiful species was known to Mr. H. B. Kirk long before he pointed it out to me about four years ago. It adheres so strongly that it is difficult to detach a specimen without tearing the base. It evidently increases by budding from the base, as clusters of specimens are often found organically attached to one another at their bases.

CORYNACTIS MOLLIS, n. sp.

This species is similar in form and external appearance to *C. Haddoni*. Column pale reddish brown, becoming darker above. Disc deep reddish brown. Shafts of principal tentacles brown; knobs of the long principal tentacles bright purplish pink, those of the shorter ones on the periphery of the disc white or pinkish white; accessory tentacles white below, becoming brown above with pale pinkish knobs.

Until quite recently I considered that this form was a well-marked variety of *C. Haddoni*. I am now convinced, however, that it is a distinct species. It never varies in colour, except that the colour of those specimens not so much exposed to the light is paler than that of others. It is never found on rocks, but only on *Lessonia*, where it is extremely abundant. The substance of the body is not so firm and more delicate than in *C. Haddoni*. When the anatomy of the two species is worked out other differences will probably be discovered.

Hab. On the stems and roots of *Lessonia*, just below low-water mark, in the neighbourhood of Wellington.

This species and an undescribed brown Sagartian, which is also extremely abundant on *Lessonia* in the same locality, appear to form the principal food of the Butter-fish (*Coridodax pullus*), one of our finest food-fishes. Sir James Hector has pointed out that the curiously formed teeth of this fish are well adapted for scraping zoophytes from seaweed ('Notes on the Edible Fishes of New Zealand,' p. 115).

CORYNACTIS GRACILIS, n. sp.

Base exceeding the column. Column cylindrical, very variable, surface smooth. Disc circular, often convex, exceeding the column in expansion. Mouth linear, prominent. Œsophagus ribbed. This species is very similar to *C. Haddoni*; the form and arrangement of the tentacles are the same; the tentacles are, however, less numerous, there being about 28 in each cycle. The shafts of the principal tentacles of the inner cycle are not so long as in *C. Haddoni*, being only slightly longer than those of the outer cycle. The whole animal is pellucid yellowish white, except the knobs of the tentacles, which are magenta.

This appears to be rather a rare form; I have only found a few specimens on *Lessonia* at Ohiro Bay near Wellington. It was first discovered by Mr. H. B. Kirk. It is a smaller species than

C. Haddoni (the height being about 13 mm., and the diameter of the disc about 8 mm.), less variable in form, and, unlike that species, it appears not to increase by budding, all the specimens which have been found being solitary.

ACTINIA TENEBROSA, n. sp.

Column cylindrical, short; body-wall smooth, without warts, extending beyond the disc and forming a well-developed collar, within which the marginal spherules lie hidden; marginal spherules numerous, bluish white; tentacles conical, in three indistinct, crowded rows. Height of column about 27 mm.; diameter of disc about 40 mm.; length of tentacles about 15 mm.

Hab. On rocks, just above high-water mark, in the neighbourhood of Wellington; abundant. Mr. T. M. Grant informs me that it also occurs freely in Queen Charlotte Sound.

This species is a good example of the effect of light on the colour of animals. Full-grown individuals in situations well exposed to the rays of the sun have the column greenish or brownish black, and the disc and tentacles dusky crimson, while those on the undersides of overhanging stones are reddish brown or crimson, the depth of colour varying according to the amount of light which reaches them. Specimens on the vertical sides of rocks (their favourite habitat) often have a patch of reddish brown on the side turned away from the light. I found a specimen under a large stone which had evidently never been in the light: the whole animal was yellowish white with a slightly greenish tinge.

This is a fine species for the investigation of the development of Actinians, for large specimens usually have a number of young ones within them in different stages of development. The young are retained in the body of the parent till they attain a considerable size.

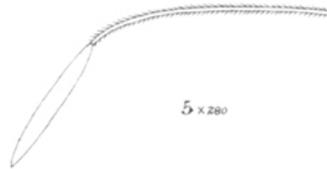
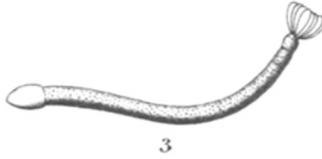
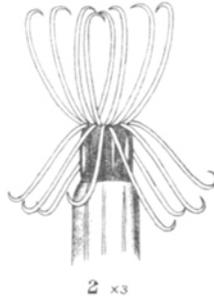
This is the southern representative of the European species *Actinia equina*. It forms another extremely interesting example of the law discovered by the late Prof. Edward Forbes, the great pioneer of the distribution of marine animals, that "similar species, to which the term *representative* is mutually applied, appear in areas distant from each other, but under the influence of similar physical conditions" (Nat. Hist. of the European Seas, p. 8). It appears that this law (if such it may be called) was also

operative in former geological times. The late Rev. Tenison-Woods, when studying the Tertiary fauna of New Zealand, found a *Fasciculipora* very nearly allied to a species of Bryozoan from the Lower Pliocene of Europe. It was, he considers, "a fact of more than ordinary interest in natural science that two such characteristic and closely allied organisms should flourish at the same epoch, in such remote seas as those of Britain and New Zealand. The differences between the fossils were so small that if they were found in the same beds they would be regarded as mere varieties." (Proc. Linn. Soc. N. S. W. vol. v. p. 283, 1881.)

I believe that most interesting and valuable results (results that would perhaps modify the views held by many as to the origin of species) would be obtained if a naturalist, thoroughly conversant with the literature and who has access to one of the great natural history libraries in England, were to collect all the information which has been recorded relating to representative species found in Europe, Australia, and New Zealand, and work out the affinities of the faunas, both terrestrial and marine, of these regions. Unfortunately this could not be done fully at present, for some of the groups, such as the Annelids, Sponges, Tunicates, Infusoria, and Insects, have not yet been thoroughly worked up in New Zealand; and some of those who have attempted to describe species have done so insufficiently, and without giving their relations and affinities.

EXPLANATION OF PLATE 36.

- Fig. 1. *Edwardsia elegans*, with disc and capitulum invected. Nat. size.
 2. " " Capitulum and tentacles. $\times 3$.
 3. *Edwardsia neozelanica*. Nat. size.
 4. *Halcampactis mirabilis*. Nat. size.
 5. " " Nematocysts of the acontia. $\times 280$.
 6. " " Disc and tentacles. $\times 3$.
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H. Farquhar del.
Parker & Peroy lith.

Geo West & Sons imp.