

ART. XXXVII.—On the Anatomy of *Paryphanta atramentaria*,
Shuttleworth.

By R. MURDOCH.

[Read before the Wellington Philosophical Society, 7th December, 1905.]

Plate XX.

AN example of this handsome species was handed to the writer by Mr. Charles Hedley of the Australian Museum, and for which best thanks are here tendered.

In shell characters this well-known Victorian species is typical of *Paryphanta*; the shell consists very largely of conchin—in fact, with the exception of the apical whorls, consists almost wholly of that substance. This is a feature quite in accord with certain of the New Zealand and Tasmanian species. The type of the genus, *P. busbyi*, Gray, is more largely built up of calcareous matter than any other member of the group that comes within my knowledge; nevertheless, it is enveloped in an exceedingly heavy coating of conchin. Suter* has drawn attention to the predominance of this substance in the shells of *Paryphanta*, and it appears to be the one prominent feature characteristic of the genus, and by which it may be distinguished from the nearly akin *Rhytida*.

The animal (preserved in alcohol) is a deep-blue, with a narrow area of yellowish-white around the margin of the foot. The rugæ large, irregular, and not forming continuous rows. On the dorsal surface of the neck are two prominent lines or grooves which proceed from the head back under the mantle. Upon the tail there appears to be no median groove, the rugæ is a trifle smaller and less pronounced than on the neck and sides. The footsole whitish, and contracted into numerous deep folds—in life it is doubtless much expanded. The mantle-margin yellowish-white, a somewhat prominent lappet at the respiratory and anal pores, also a smaller one towards the left side. The head of the animal is much drawn in, and the labial projections are not discernible; the tentacles are also completely retracted.

Internal Anatomy.—The buccal mass (figs. 1, 2) has the usual form in this group of animals; it is large and muscular, with the posterior end curved down and forward. The retractor muscle is a large, powerful structure; it has no attachment with the posterior end of the buccal mass, or, to be more correct, what appears to be the posterior end (fig. 2), but is applied to

* "Journal of Malacology," 1899, vol. vii, pt. 3, pp. 49, 50.

all sides except a narrow dorsal area. The greater portion of the retractor goes to the ventral side, where it forms a well-defined dense mass (fig. 1a). Proceeding anteriorly from this mass are strong widely spreading muscular bands, which envelop the ventral and lateral areas of the buccal mass. The posterior-lateral attachments of the retractor muscle are continuous with the ventral attachment, and sweep up on to the dorsal surface, when, proceeding forward, they coalesce and form a thin envelope. On either side immediately above the ventral muscular mass is a small area in which the constrictor muscle is not enveloped by the external muscular sheath (fig. 1b), on each area is a well-marked flexure, which on dissection proves to be the junction between the curved down and forward posterior portion of the buccal mass and that immediately above; the two parts are woven together; the odontophoral cartilage and accompanying muscles curve down and terminate in this area, which must be regarded as the true posterior termination of the buccal mass. The form of attachment of the retractor muscle proves to be somewhat variable in the different species. *P. fumosa*, Ten.-Woods,* a Tasmanian species, presents a markedly different condition from what obtains in *P. busbyi* and *P. hochstetteri*; while the species under notice, though nearer to the condition of the New Zealand species, forms a connecting-link with *P. fumosa*.

The radula is about 23 mm. in length by 5 mm. in width, and is armed with 105 transverse angular rows of teeth. The number of teeth per row is somewhat variable; towards the posterior end of the radula, where they form an acute angle, we get the formula 66-0-66, while on the middle portion 63-0-63 appears to be the more usual number. Suter refers to this species in his description of *P. edwardsi*,† and gives the formula 50-1-50. The absence or presence of a rachidian tooth in this genus is not a matter of much importance; in the radula before me it is certainly non-existent. The tooth on either side of the central cleft (fig. 3) is minute and probably functionless; the succeeding teeth large, all aculeate, gradually increasing in size; thence uniform for a considerable number, when they again gradually become shorter; finally, towards the margin (fig. 4), short and robust.

The œsophagus (*œs.*) enters the buccal cavity in the anterior third; a salivary duct (*s.a.*) on either side of the œsophagus empty into the cavity. The salivary glands (*s.g.*) are small and almost completely fused together. The stomach and tract

* Trans. N.Z. Inst., vol. xxxvi, pp. 156-61, pl. vi, 1903, issued 1904.

† Proc. Mal. Soc. Lond., vol. iii, p. 290.

of the intestine are similar to other members, and call for no special mention.

The nervous system, with regard to the position of the several ganglia and their connectives, is identical with other species of the genus. The same may be said of the muscular system, in so far as the form and position of the principal muscles, with the exception of the form of attachment of the buccal-mass retractor, which has already been dealt with. The right-tentacle retractor passes between the branches of the genital system.

The pedal gland forms a long, narrow, much-folded tube, resting upon the floor of the body-cavity, its posterior end imbedded in the muscles of the foot, to which it has a muscular attachment.

Generative Organs (fig. 5).—The penis forms an elongated, club-shaped organ, with the retractor muscle inserted at the apex. The vas deferens arises near to the distal end of the penis; proceeding forward it is for some distance attached to the wall of the male organ, adding to the club-shaped appearance of the latter; thence free, and reduced to a very slender tube until it rests upon the anterior portion of the oviduct. From this point it becomes somewhat more prominent, and finally forms a sac-like enlargement as it enters the posterior termination of the free tube of the oviduct. The interior walls of the posterior portion of the penis, and the attached portion of the vas deferens, are clothed with minute papillæ-like structures. The receptaculum seminis arises from the free oviduct where the latter becomes merged in the sacculations of the uterus. It arises as a small sac, which in the natural position of the organs is enveloped by a large fold of the uterus, thence reduced to a slender tube, and terminating in an oval-shaped enlargement tucked in at the base of the albumen-gland. The albumen-gland is a large, irregularly ovate mass; from it proceeds the hermaphrodite duct, which is somewhat convoluted. The hermaphrodite gland consists of three or more follicular masses imbedded in the right lobe of the liver. These structures are difficult to follow, as in colour they are similar to the surrounding mass.

Palatal Organs (fig. 6).—The kidney is shortly tongue-shaped, narrowed anteriorly, and curved to the left, with the pericardium resting against the left concave margin. In length it is about one-third greater than the pericardium, and less than half the length of the lung. The ureter follows the margin of the kidney and opens into the right posterior corner of the lung, close to the rectum. The venation of the lung is beautifully clear and distinct, due to its pigmented condition. In the figure given no attempt has been made to delineate the finer details, which

includes the delicate network of connectives between the efferent and afferent branches. On the rectal side of the lung are numerous efferent and afferent vessels, uniform in size and finely branched; while on the cardiac side, in addition to some small, short tributaries, are four strongly marked and much-branched veins. The posterior of these veins, which unites with the great pulmonary vein a little anterior to the junction of the latter with the auricle, is much the largest; it divides into two prominent branches, each with numerous lesser tributaries. The afferent vessels in this area are correspondingly large and much branched.

EXPLANATION OF PLATE XX.

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| Fig. 1. | } Buccal mass, &c. |
| Fig. 2. | |
| Fig. 3. | } Teeth. |
| Fig. 4. | |
| Fig. 5. | Generative organs. |
| Fig. 6. | Pallial organs. |

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| <i>alb.g.</i> Albumen-gland. | <i>per.</i> Pericardium. |
| <i>af.v.</i> Afferent pulmonary vessels. | <i>r.</i> Rectum. |
| <i>ef.v.</i> Efferent pulmonary veins. | <i>r.m.</i> Retractor muscle. |
| <i>h.g.</i> Hermaphrodite gland. | <i>r.s.</i> Receptaculum seminis. |
| <i>h.d.</i> Hermaphrodite duct. | <i>r.l.</i> Right mantle lobe. |
| <i>k.</i> Kidney. | <i>s.d.</i> Salivary ducts. |
| <i>ll.</i> Left mantle lobe. | <i>s.g.</i> Salivary gland. |
| <i>œs.</i> Œsophagus. | <i>u.</i> Ureter. |
| <i>p.</i> Penis. | <i>vd.</i> Vas deferens. |
| <i>p.v.</i> Great pulmonary vein. | |

ART. XXXVIII.—Notes on New Zealand Mollusca, with Descriptions of New Species and Subspecies.

By HENRY SUTER.

Communicated by A. Hamilton.

[Read before the Wellington Philosophical Society, 4th October, 1905.]

Plate XVIII.

Meleagrina radiata, Lamarck (1836).

Lamarck, Anim. s. vert., 2nd ed., vol. vii, 1836, p. 107.

Specimens of this shell were found at the Kermadec Islands by Captain J. Bollons, and I am indebted to Professor W. H. Dall, of Washington, for their identification.