closely watched the flight of this wonderful bird know, is ever in motion, sometimes flapping on the surface of the sea as it dips to a wave, or elevated as it turns in the force of the gale, and, though no doubt difficult to observe, it is in constant quiver of slight rotation of the broad plumes, opening and closing like Venetian blinds. We have in the mechanism thus described a sufficient source to sustain the prolonged, and to the casual observer apparently effortless, flight of the albatros. The locking of the elbow-joint in the albatros is exactly analogous to the locking of the knee-joint of the human skeleton by which man maintains without fatigue that erect attitude which proclaims his supremacy.

It is very much to the point that the only other bird which posseses a patelloid bone controlling the elbow-joint as the patella does the knee-joint is the penguin, and in this case the wing-bones have also to be kept rigid during the penguin's flight under the water.

Art. XXXIV.—*Further Contribution to a Knowledge of the New Zealand Sponges.*

By H. B. Kirk, M.A.

[*Read before the Wellington Philosophical Society, 28th November, 1894.*]

Plates XXIV.–XXVI.

In my former paper on New Zealand sponges I expressed an intention of describing the New Zealand sponges in something like their natural order. I think it best, however, to describe at once the two very interesting sponges that form the subject of this paper. I also abandon the intention of copying, except in rare instances, the descriptions of New Zealand sponges already published.

Sycon dendyi, n. sp. Plate XXIV.

The genus *Sycon* is thus defined in Dr. Dendy's "Synopsis of the Australian Calcarea Heterocœla": Sycettidæ with "radial chambers not inter-communicating; articulate tubar skeleton; the distal ends of the chambers provided each with a tuft of oxeote spicules."

The definition above given, taken with that of the family Sycettidæ, did not contemplate the inclusion of such a sponge as forms the subject of this paper—a sponge that has a well-developed cortical skeleton of large oxea, through which the

distal cones protrude. This sponge forms a most interesting link between the two genera *Sycon* and *Ute*. In spite of its striking peculiarity, I think it better to place it in *Sycon*, from which received definitions do not exclude it, than to establish a new genus.

The sponge is solitary, or forms small clusters. It is about 20mm. in height and 7mm. in breadth. There is a well-developed gastral cavity and a short peristome. There is a dermal cortex containing several layers of large oxeote spicules, longitudinally disposed, and it is pierced by the projecting distal cones of the radial chambers. The tubar skeleton consists of sagittal 3-radiate spicules, and the well-developed gastral cortex consists of 3-radiates and 4-radiates, the apical rays of the latter projecting into the gastral cavity in the usual way.

Spicules :—

Oxea of dermal cortex : These are very large fusiform spicules, tapering to moderately sharp points. 1·18mm. × 0·06mm.

Oxea of peristome : Thickest near the proximal end ; sharp-pointed. 0·25mm. × 0·01mm.

Oxea of distal cones : Thickest part about one-third of the distance from the proximal end. 0·11mm. × 0·01mm.

Triradiates of chamber-layer : Sagittal ; sometimes irregular. The basal ray is generally longest in the spicules that immediately underlie the gastral cortex. Greatest size of basal ray, 0·23mm. × 0·018mm. ; of oral rays, 0·13mm. × 0·015mm. The oral rays generally curve away from the basal ray, which they leave at an angle of about 110°. Often one of the oral rays is shorter than the other. Sometimes the basal ray is shorter than either of the oral rays.

Quadriradiates of gastral cortex : Sagittal ; basal ray, 0·14mm. × 0·01mm. ; oral rays, 0·08mm. × 0·008mm. The rays taper evenly to a sharp point.

All the radial chambers have well-marked chamber diaphragms, the circular opening in which communicates with the short canal leading through the gastral cortex to the gastral cavity. The chambers are octagonal in transverse section ; the inter-canals quadrangular.

A specimen containing ova shows frequently two or three ova in one capsule—a rudimentary ovary.

Dr. Dendy has already pointed out ("Quarterly Journal of Microscopical Science," 1892, p. 168) that *Sycon gelatinosum* has a rudimentary pore-bearing membrane stretched between the distal cones, and that a similar membrane in *S. boomerang* contains a few spicules, showing the path by which the *Grantia* type has probably emerged from the *Sycon ;* but the

existence of the distal cones characteristic of *Sycon*, together with the longitudinally-disposed cortical oxea that mark *Ute*, has not hitherto been known.

This sponge shows striking and beautiful colour-changes at death. When living it is either white or dull-purple as a rule, but in dying it turns saffron-colour, red, and bright-purple.

Localities.—Cook Strait; Hokianga Heads.

Lamontia, new genus.

Grantidæ with spherical or polygonal flagellated chambers; skeleton of the chamber-layer consisting entirely of oxea; dermal cortex containing radiates.

Lamontia zona, n. sp. Plates XXV., XXVI.

Sponge solitary; oxea of chamber-layer small and curved; cortical skeleton of large 3-radiates, of small oxea like those of the chamber-layer, and of large projecting oxea and oxy-strongyla; gastral armature for the most part of small dagger-shaped 4-radiates, but of large 4-radiates near the oscule; peristome of long oxea with sagittal 3-radiates at the base on the inner side. A specialized pore-area is present, and this area is without any projecting oxea or oxy-strongyla.

This sponge is from 14mm. to 20mm. in height, and from 4mm. to 7mm. in breadth. The external armature of oxea does not appear at first sight to differ from that of many other leuconoid sponges, but the unarmed pore-area enables the sponge to be distinguished at a glance. This area is usually a little below the oscular opening, and in the best specimens it forms a regular zone of a dead-white colour. It may, however, in specimens more or less misshapen, be irregular in outline, and may even become a longitudinal strip. The groups of pores in this specialized area lead into well-marked chones, below which are well-developed subcortical chambers. Between the chones are columns and walls of superimposed 3-radiates, which support the pore-bearing membrane. The membrane contains small oxea exactly like those of the chamber-layer. I believe that the existence of a specialized pore-area is not known in any other calcareous sponge. Pores are not confined to the specialized area, but are scattered over the whole dermal surface. Beneath the cortex, in other parts of the sponge than below the pore-area, are subcortical lacunæ of irregular shape and varying size.

Spicules:—

(1.) Projecting oxea of dermal cortex: Very large, thickest near the proximal end, often of wavy outline; size may be as much as 0·9mm. × 0·051mm., or even greater.

(2.) Spined oxy-strongyle of dermal cortex: A beautiful spicule, not always easily found, but always present, and sometimes abundant. The spined portion is usually about one-quarter of the whole spicule, and terminates in the rounded, distal end. From this end the spicule tapers evenly to a sharp point. Measurement, 0·28mm. × 0·01mm.

(3.) Triradiates of dermal cortex: These are generally irregular or slightly sagittal, the oral rays in the latter case being slightly curved towards each other: the rays may be 0·35mm. × 0·035mm. They sometimes taper evenly to a point, but generally they taper more rapidly at the ends.

(4.) Oxea of cortex and parenchyma from 0·07mm. to 0·1mm. × from 0·005mm. to 0·01mm. The spicule is thicker at one end than at the other, and near this end it makes a well-marked bend. Towards the sharper end there is usually a curve in the opposite direction, the spicule having thus a slightly sigmoid outline.

(5.) Oxea of peristome: Long and thin spicules, thickest in the proximal portion. 1·5mm. × 0·015mm.

(6.) Triradiates of peristome: These are very graceful sagittal spicules. The basal ray is very slight and tapering, and may measure 0·45mm. × 0·008mm. The oral rays are flattened in the plane of the basal ray, from which ray they usually diverge at an angle of about 50°; they curve slightly inwards from the plane of the basal ray, and they may also curve very slightly upwards or downwards. The outline of the oral rays may be tapering or curving, the rays being often widest and flattest at about two-thirds of the distance from the point of origin. Measurement of oral rays, 0·15mm. × 0·015mm. These spicules are arranged with great regularity at the base of the peristome on the inner side, the basal ray directed downwards, and the oral rays spread across the lower parts of the oxea of the peristome. It may be noted that the gastral epithelial cells are well marked till just above these spicules, where a well-marked sphincter terminates the endodermal tissue.

(7.) Quadriradiates of gastral surface: Near the oscule the gastral surface shows large sagittal quadriradiates, which vary greatly. Generally the rays, which have a curving or wavy outline, have rather blunt points. Basal ray, 0·26mm. × 0·025mm.; oral rays, from 0·2mm. to 0·25mm. × 0·02mm.; apical ray, from 0·1mm. to 0·15mm. × 0·02mm. to 0·025mm. These spicules are not numerous.

The larger exhalent canals and the lower part of the gastral cavity are freely armed with small dagger-shaped 4-radiates, much like those of *Leucandra gladiator*, Dendy. The rays lie almost in the same plane. The basal ray is short and stout, 0·02mm. × 0·008mm. The oral rays, which are of about the

same length as the basal ray, or slightly shorter, curve towards the apical ray; or one may curve towards the apical and one towards the basal ray. The apical ray is comparatively long, 0·05mm.; it is generally slightly curved, and sharply pointed. Between these small dagger-shaped spicules and the large 3-radiates of the oscular region all stages in form and size may be found.

A peculiarity of this sponge is that the gastral cavity becomes almost entirely obliterated in adult specimens, the exhalent canals converging to open very near the osculе. In young specimens the gastral cavity is very well marked.

I am indebted to Dr. Dendy for pointing out clearly what I had, for my own part, only very indistinctly felt—that the parenchymal oxea of this sponge, so like in form to the "mortar spicules" of many calcareous sponges, are probably incursive from the dermal cortex, and replace original parenchymal radiates, just as in *Anamixilla*, Pol., the large parenchymal radiates are probably incursive. If this view is correct, *Lamontia* is especially interesting as showing how the characteristic skeleton of *Leucyssa* may have been derived from that of *Leucandra*.

Locality.—Cook Strait. The sponge is rare.

EXPLANATION OF PLATES XXIV.–XXVI.

Plate XXIV.

Sycon dendyi.

Fig. 1. A group of individuals, natural size.
Fig. 2. Portion of dermal surface: *c*, distal cones; *o*, dermal oxea; *p*, pore.
Fig. 3. Longitudinal section: *r.c.*, radial chamber; *d*, chamber diaphragm; *o*, dermal oxea; *c*, distal cone.
Fig. 4. Transverse section: *i*, inter-canal.
Fig. 5. Section across tubes and inter-canals: *r.c.*, radial chamber; *i*, inter-canal.
Fig. 6. A prosopyle, surrounded by collared cells.
Fig. 7. Unsegmented ovum.
Fig. 8. Ovum subdivided: *c.c.*, collared cells; *e.c.*, endothelial cells.
Fig. 9. Three segmented ova in a common capsule (the ovum on the right was damaged, and I have not shown it in section): *c.c.*, collared cells; *e.c.*, endothelial cells.
Fig. 10. Longitudinal oxea of dermal surface.
Fig. 11. Oxea of cones.
Fig. 12. Oxea of peristome.
Fig. 13. Sagittal 3-radiates of chamber-layer.
Fig. 14. Irregular 3-radiates of chamber-layer.
Fig. 15. 4-radiates from gastral cortex.
Fig. 16. Two collared cells, with flagellum retracted, and an amœboid cell.

PLATE XXV.

Lamontia zona.

Fig. 1. The sponge, natural size.
Fig. 2. Portion of pore-area, from below.
Fig. 3. A pore, with muscle (?) cells.
Fig. 4. Portion of base of peristome, with cells of sphincter.
Fig. 5. Section through pore-area: *ch.*, chone; *s.c.* subcortical crypt; *col.*, column of 3-radiates.
Fig. 6. Longitudinal section: *e.c.*, exhalent canals.
Fig. 7. " *s.l.*, subcortical lacuna.
Fig. 8. Prosopyle and collared cells.

PLATE XXVI.

Lamontia zona.

Fig. 1. Parenchymal oxea.
Fig. 2. Large oxea of dermal cortex.
Fig. 3. Spined oxy-strongyla of dermal cortex.
Fig. 4. Oxea of peristome.
Fig. 5. *a–c*, 3-radiates from base of peristome.
Fig. 6. *a–d*, 3-radiates of dermal cortex.
Fig. 7. *a–f*, 4-radiates from neighbourhood of oscule.
Fig. 8. *a*, three "dagger" spicules from gastral surface.
b, " " *in situ.*

ART. XXXV.—*On a New Shell* (Anomia walteri).

By Sir JAMES HECTOR.

[*Read before the Wellington Philosophical Society, 20th February, 1895.*]

SHELL fragile, nacreous, with brilliant lustre and translucent. Form irregular, the upper valve convex, corrugated, and often bullate. Structure lamellar, with faintly-marked wide ribs and wavy rays. On the interior surface a triangular area of white shell extends from the cartilage-pit to the middle of the valve, within which area are three distinct and equal-sized muscular scars. The cartilage-pit is single and straight, submarginal, and under a feebly-developed beak. The lower valve is horny and almost transparent, except an opaque white crescent round the notch. In form it is concave, and imbedded in the upper valve like an operculum. The notch is of a moderate size, with a strong anterior process which is hinged to the pit in the upper valve by a black ligament. The posterior margin is very thin. The shelly plug has not been preserved in any of the specimens. Colour: Upper valve rich honey-yellow, sometimes with pink tint; lower valve colourless.