

end, situated in a line with the upper tentacle on the right side.

Mandible crescent-shaped, not rostrated, vertically grooved and interstriated, denticulated on the margin.

Lingual ribbon of 96 rows of an infinite number of similar lanceolate teeth.

Dimensions:—Total length when crawling (without tentacles), 30 millimetres; total width when crawling, 9 millimetres. (Measures made by Mr. Petterd.)

Locality:—Near Launceston (W. F. Petterd); Southport (B. R. Dyer).

A CONTRIBUTION TO OUR KNOWLEDGE OF THE
UNIONIDÆ OF THE LAUNCESTON TERTIARY
BASIN.

BY R. ETHERIDGE, JUN., F.G.S.

(Of the British Museum),

Corr. Member R. Socs. Tasmania, Victoria, and of the
Linnean Society of New South Wales.

[*Read 13th April, 1880.*]

Several interesting papers having recently appeared on the Tertiary beds of the Launceston Basin, by Mr. R. M. Johnston, it struck me that the description of two forms of *Unio*, occurring in these beds, might be acceptable to the Royal Society, especially as the subject appears to be, comparatively speaking, a new one.

So far as I am aware, the literature relating to the occurrence of this genus in the Tertiary and Post Tertiary formations of Australasia is very limited.

Omitting, as not coming within the scope of this present

enquiry, the shell named, but not described by Prof. McCoy as *Unio Dacombii*,* from the Wannon Secondary beds of Victoria, the first detailed notice we appear to have of *Unio* in Tertiary or Post Tertiary formations, is the description by Capt. F. W. Hutton† of two New Zealand species, *U. Aucklandica*, Gray, from the coal formation of Dunstan, Otago, and *U. inflata*, Hutton, from the Ototara group of Morley Creek, Southland. In a very instructive and able paper on "The composition and extent of certain Tertiary beds in and around Launceston," Mr. R. M. Johnston‡ has given many facts which have a direct bearing on the subject under discussion. He has shown that previous to the later volcanic period the valley of the Tamar was occupied, to a great extent, by a large lake, in which was slowly deposited beds of lignite, with laminated clays and sands, denominated by him the Launceston Series, and containing the remains of an extensive flora. The Launceston Series is divided by Mr. Johnston into three zones, from the lower of which specimens of a *Unio* have been obtained at Muddy Creek, on the W. Tamar. The size of this lake is computed to have occupied "not less than 600 miles of what now is the most fertile and cultivated portion of the Island of Tasmania."||

The next mention we have of the occurrence of the genus *Unio* in Australasian Tertiary beds is that by my friend and former colleague, Mr. C. S. Wilkinson, F.G.S., Government Geologist for N. S. Wales. In his "Report of Progress for the year 1876," Mr. Wilkinson places on record that "In the Home Rule Lead (Gulgong), at a depth of 126 feet, a fossil *Unio* was found associated with the vegetable fossils. The discovery is interesting, inasmuch as this is the first fossil shell of the kind yet found in the Pliocene Tertiary gold drifts."§ The plants referred to by Mr. Wilkinson are *Spondylostrobus*, *Plesio cappar*, and others characteristic of the Victorian and N. S. Wales gold leads, described by Sir Ferdinand von Mueller. The *Unio*, although a unique specimen, was forwarded to me by Mr. Wilkinson for description. After comparing it with the fine collection of recent *Unionidæ* in the British Museum, I came to the conclusion that, taking into consideration the state of preservation of the fossil, it agreed sufficiently well with the New Zealand *U. Aucklandicus*, Gray, to be regarded only as a variety of that species. A description, under the name of *U. Auck-*

* In Smyth's Progress Rep. Geol. Survey Vict., 1874, pp. 24 and 35.

† Cat. Tert. Moll. and Echinodermata of N. Zealand, 1873, p. 25.

‡ Papers and Proc. R. Soc. Tas. for 1873, pp. 39-47.

|| Loc. cit. for 1874, p. 58.

§ Annual Rep. Department of Mines, N. S. Wales, for 1876, p. 172.

landicus, var *Wilkinsoni*, has been accordingly forwarded to Sydney for publication. So far as I am aware, the above extracts give an outline of all that has been written on the subject of fossil *Unionide* in Australasia, although I should imagine, from the widespread nature of certain Post-Tertiary deposits over the continent of Eastern Australia, containing the remains of *Diprotodon*, gigantic kangaroos, and other extinct mammals, associated with fluviatile and brackish water mollusca, that shells of the *Unionide* will likewise be met with.

To return to the *Unios* from the Tamar River. Specimens first came under my notice in a collection of Tasmanian fossils, presented to the British Museum by Dr. Milligan, and being, so far as I could ascertain, not directly noticed, I wrote on the subject to my friend Mr. R. M. Johnston, who has kindly supplied me with the following facts:—‡ “Specimens of the *Unio* sp. of the ‘Launceston Tertiary Basin,’ which has not yet been described are now for the most part in a state of ‘brown hematite,’ matrix a ferruginous clay, associated with leaves described by me in my first paper on the Launceston Tertiary Basin. . . . I could never get a glimpse of the hinge teeth. It, perhaps, may be identical with your *U. Wilkinsoni*, which I have never seen.”

Dr. Milligan’s specimens quite bear out Mr. Johnston’s description of their conversion into brown hematite, and so far has this alteration proceeded, that it is with difficulty the more detailed characters of the species can be distinguished. Amongst Dr. Milligan’s specimens there are undoubtedly two distinct forms, one having the outward aspect of a *Unio* proper, the other that of an *Anodon*, the latter being represented by the least number of examples, but all possessing the same ferruginous appearance.

The following is a description of the species:—

GENUS UNIO, RITZIUS, 1788.

Unio Johnstoni, *Sp. non.* (Fig. 1 and 2), *Sp. char.* Shell transversely elongated, acuminate towards the posterior; anterior end convex and very gibbous; posterior end bluntly pointed, and gradually acuminate from the anterior end; anterior margin obliquely rounded downwards; posterior margin narrow and rounded; hinge line straight, gradually descending from the umbones towards the posterior end; ventral margin gently rounded or convex, entire, no sinuation; flanks of the shell most convex at a point on the anterior end midway between the beaks and the ventral margin, whence the sides rapidly decline to the latter,

‡ In a letter dated “Launceston, 9th June, 1879.”

gradually flattening towards the pointed posterior end; diagonal ridge inconspicuous, rounded; posterior slope, small; umbones large, broad, becoming somewhat flattened by decortication; shell substance moderately thick; surface coarse and rough on the anterior end, with strong, prominent, concentric lines of growth, which gradually flatten out into laminae on the posterior end; bent upwards at the rounded diagonal ridge; no sign of radiatory lines; dental and muscular characters unknown. Length, 3 in. 10 lines; breadth, 2 in.; depth of the united valves, 1 in. 10 lines.

Obs.—The condition of the specimens, both in this and the succeeding species, renders it very difficult to give some of the characters with accuracy. This is especially the case with the surface ornament, which becomes much obliterated.

I have carefully compared these shells with the fine collection of recent *Unionidae* in the British Museum, and cannot suggest any species with which they may be compared, unless it is *Unio trimidus*, Ritzius.

There are many produced species of *Unio*, such as *U. Buddianus*, Lea; *U. Shepardianus*, Lea; or *U. rectus*. Lamk.; but with neither of these are there characters in common. In the massive convex form our species approaches *Unio Anodontoides*, Lea, from Alabama, but acuminate posteriorly too rapidly, and has not the ventral sinuation of that species. Similarly, it is too convex on the anterior side of the shell for *U. Gibbosus*, Burns, a North American form, and does not possess the well-marked diagonal ridge of the latter.

U. Johnstoni does not resemble any of the living Australian species with which I am acquainted, but approaches nearest to *U. mutabilis*, Lea, which is found around Brisbane, although the resemblance here is of a slight character. According to the most recent investigations amongst the land and freshwater shells of Tasmania, by the Rev. J. E. T. Woods* and Mr. R. M. Johnston,† only one species of *Unio* is still known to exist there. Both these authors quote *U. Moretonicus*, Sow., as occurring in the northern rivers of Tasmania, and a comparison of this with *Unio Johnstoni* is unnecessary, the dissimilarity between the two shells is so great; but here arises the interesting fact that Tasmania, at the present day, should possess only one species of *Unio*, whilst in Tertiary times it is possible that several existed.

I have not been able to meet with any described fossil *Unio* with which the present species need be compared.

* On the Freshwater Shells of Tasmania (*Papers and Proc. R. Soc. Tas.*), 1875, 8vo., p. 17.

† Further Notes on the Freshwater Shells of Tasmania (*Papers and Proc. R. Soc. Tas.*), 1877, 8vo., p. 11.

There is a certain resemblance between *U. Johnstoni* and *U. Pachyodon*, Ludwig* (from the Tertiary strata of Oppenheim, on the Rhine), when viewed from the side, but the compressed form of the valves at once separates our shell from this species. Several species of *Unio* have been described from the Wahsatch group of the Wyoming Tertiary strata, by Dr. C. A. White,† but none of them appear to correspond with our *U. Johnstoni*.

Of the two species described from New Zealand strata, neither will correspond with our form. One, *U. Aucklandica*, is oblong and compressed; the other, *U. inflata*, Hutton, is oval and ventricose; lastly, *U. Johnstoni*, is quite distinct from my m.s. species, *U. Wilkinsoni*, of the Gulgong deep leads.

Sandberger figure a number of fossil *Unios* in their "Susswasser Conchylien," none of which need be compared with the Tasmanian specimens.

Loc. and horizon.—In a ferruginous clay, Tertiary beds of the Tamar River, between Whirlpool reach and George Town, Tasmania (*British Museum*, Milligan Collection, Reg. No. 9628); Muddy Creek, West Tamar (*R. M. Johnston*).

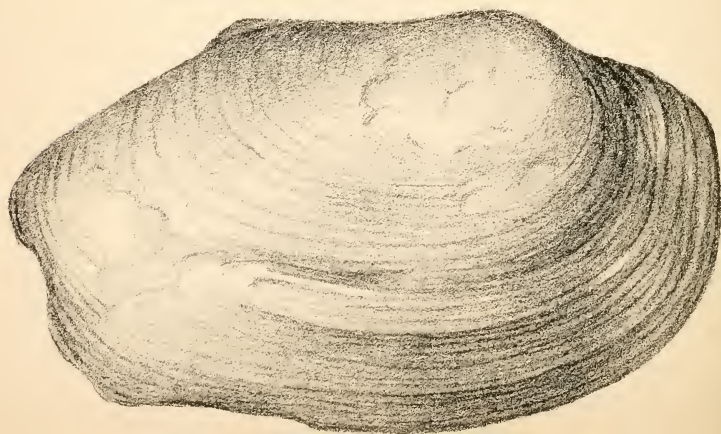
GENUS ANODONTA CUVIER.

Anodonta (?) *Tamarensis*. *Sp. nov.* Fig. 3 and 4. *Sp. chars.*—Shell transversely-obliquely-oval, generally compressed, in marginal outline obliquely hatchet-shaped; anterior and posterior ends compressed, sharp at the margins; anterior outline (margin) rounded; posterior outline obliquely truncated in the upper portion, rounded in the lower; hinge line horizontal, straight; ventral margin rounded obliquely from the anterior end; beaks near the centre of the hinge, but, as regards the whole shell, more anterior, not inflated, but much decorticated: diagonal ridge and posterior slope to all appearances not defined; convexity of the shell not great, the most convex point being below the beaks, at about the middle of each valve; angle formed by the hinge line and truncated posterior margin = 143° . Shell substance much eaten; surface decorticated, but apparently covered with numerous concentric superimposed layers of epidermal matter, following the marginal outline of the shell. Length, 3 in. 7 lines; breadth, 2 in. 3 lines; thickness of the united valves, 1 in. 3 lines.

Obs.—This shell is manifestly so different from the preceding, both in marginal outline and general form, that,

* Dunker's Palæontographica, 1863, xi. lief 3, p. 170 to 22, f. 1-5.

† Bull., n.s., Geol. and Geograph. Survey of the Territories, 1877, iii. pp. 603-606.



although only a single specimen exists in the collection, I think it should not be passed over in silence.

With the hinge characters I am quite unacquainted, the reference to *Anodonta* being made purely on external resemblance. It is, of course, possible that it may, after all, be an *Unio*, as some species of this genus assume a more or less *Anodon*-like aspect.

The present shell is too wide anteriorly, and the hinge is too horizontal for *Unio Menziesi*, Gray, from New Zealand. It has more the aspect of *Unio radiatus*, Gmelin, but it is too long a shell for this species, and the posterior end too much produced.

Our fossil approaches some of the flat forms of *Anodonta*, and it is with these that it must be compared. The more or less compressed valves, strong posterior angulation of the dorsal margin, obliquely truncated posterior margin, and obliquely rounded anterior margin, pending a knowledge of the dental characters of the hinge, all point in this direction.

Loc. and horizon.—Similar to the first locality of the preceding species (*British Museum*, Milligan Collection, Reg. No., 96,929).

DESCRIPTION OF THE FIGURES.

UNIO JOHNSTONI, ETHERIDGE, JNR.

Fig. 1. Side view of the right valve of an almost complete specimen, nat. size; Tamar River; Coll. Brit. Mus.

Fig. 2. The same specimen seen from the back, showing the hinge, and convexity of the valve; nat. size. *Anodonta Tamarensis*, Etheridge, jn.

Fig. 3. Side view of the right valve somewhat deficient about the postero-ventral region; nat. size; Tamar River; Coll. Brit. Mus.

Fig. 4 The same shell showing the hinge line, and convexity of the valves; nat. size.

Errata.

Page 19.—Sixth line from top, for "*Aucklandica*" read "*Aucklandicus*."

Fourteenth line, for "*which was slowly*," read "*which were*," &c.

Tenth line from bottom, for "*Plesio capparis*," read "*Plesiocapparis*."

Page 20.—Twelfth line from bottom, for "*Ritzius*," read "*Retzius*."

Next line, for "*Sp. non.*," read "*Sp. nov.*"

Eighth line from bottom, for "*accuminate*," read "*acuminate*."

Page 21.—Eighteenth line from top, for "*Unio trimidus*," read "*U. tumidus*," and for "*Ritzius*," read "*Retzius*."

Twenty-third line, for *accuminates*, read *acuminates*.

Twenty-sixth line, for "*Gibbosus*," read "*gibbosus*."

Seventh line from bottom, after Tasmania insert ; instead of ,

Page 22.—Second line, for *U. Pachodon*, read *U. pachodon*.

Eighth line, for "*our U. Johnstoni*," read "*U. Johnstoni*."

Tenth line, for *Aucklandica* read *Aucklandicus*.

Eleventh line, for *inflata* read *inflatus*.

Thirteenth line, omit *m.s.* before *species*.

Fifteenth line, for *Sandberger*, read the *Messrs. Sandberger*.

Twenty-second line, for *Genus Anodonta Cuvier*, read *Genus anodonta*, Cuvier.

Second line from bottom of note, for *u.s.* read *U.S.*

Page 23.—Description of the Figures :—The fifth line below this heading should end at *nat. size*.

ANODONTA TAMARENSIS, Etheridge, jun., is the heading for description of figures 3 and 4, as UNIO JOHNSTONI is for figs. 1 and 2.

Fifth line from bottom, insert comma after *valve*.