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TWO UNDESCRIBED PELECYPODA FROM THE LOWER CRETACEOUS OF QUEENSLAND IN THE COLLECTION OF THE AUSTRALIAN MUSEUM.

By R. Etheridge, Junr., Curator.

(Plates xxxiv. – xxxv., and Fig. 21).

1. FURTHER EVIDENCE OF TEREĐO.

The presence of Teredo-like tubes in our Lower Cretaceous Series, has been known for some time, but until the specimens about to be described came under notice, the existence of this boring Mollusc was not thought to be as plentiful as now proves to be the case.

The first record of Teredo in Australian Mesozoic beds is due to the late Mr. Charles Moore, who described a shell, forming one of a colony, as T. australis,1 from the Oolite of West Australia. This had been previously recorded by the late Rev. W. B. Clarke as a Pholas.2 Some years subsequent to Moore’s description, I recorded the presence of Teredo in limited quantity in both our Upper and Lower Cretaceous—impressions of tubes in the grit of the Croydon Goldfield,3 and shelly tubes in limestone,4 brought under my notice by the late Rev. J. E. T. Woods, with, in one instance, a portion of the valves remaining. Teredo-bored wood was also collected from the Rolling Downs Formation by Mr. G. Sweet,5 at Hughenden and the Walsh River.

Amongst many other interesting Lower Cretaceous fossils collected and presented to the Trustees by Mr. W. H. Blomfield are fourteen blocks of variable size, either representing or forming parts of tree-trunks, riddled with the shelly tubes of Teredo, many of large size.

Some of the blocks represent portions of trunks preserved in the round, others divided longitudinally, and some in pieces only. The following measurements of the two former conditions were noted:—

<table>
<thead>
<tr>
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<th>Length (direction of growth)</th>
<th>Breadth (right angles to direction of growth)</th>
<th>Circumference or girth.</th>
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<tr>
<td>a</td>
<td>1 3</td>
<td>1 0</td>
<td>2 5</td>
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<td>b</td>
<td>0 8</td>
<td>1 0½</td>
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<tr>
<td>c</td>
<td>0 9</td>
<td>0 11½</td>
<td>2 9</td>
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<tr>
<td>d</td>
<td>1 1</td>
<td>0 10</td>
<td>2 4</td>
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</table>

They indicate a fairly uniform size.

2 Clarke—Ibid., xxiii., 1867, p. 8.
3 Etheridge, Junr.—Geol. Pal. Queensland, etc., 1892, p. 572, pl. xliii., fig. 11.
4 Etheridge, Junr.—Loc. cit., p. 19.
5 Etheridge, Junr.—Loc. cit., p. 573.
The *Teredo* tubes penetrate the wood both parallel and at right angles to the direction of growth of the trees, and in either case are more or less parallel and contiguous to one another, or twisted and interlaced in a very confused manner, contorted and even returned on themselves, or crumpled in the form of the letter S. A similar variability in the direction of the tubes is described by Mr. J. Griffith in the great Sumatran *Kuphus*, during life. In one instance, at least, where half the trunk is preserved transversely, the tubes extend to the very centre. According to the direction of penetration, the tubes are seen in transverse section, longitudinal section, or on the outsides of trunks in the round. The anterior closed ends of the tubes or caps are convex or round, and the diminution in diameter towards the posterior is very slow. The average diameter of the largest tubes at the anterior end is one inch, but a few have been measured as much as one and a quarter inches, and in a single instance the cross section was one and a half inches. These diameters dwindle at the posterior ends to two-eighths and five-sixteenths of an inch. The total length is unknown, but the longest portion measured was six inches. None of the tubes, so far as can be ascertained, are perfect, neither was I fortunate enough to discover in any of the natural sections the valves at the anterior ends, or the forking and septal lamellae towards the posterior terminations.

The walls are very variable in thickness, some presenting a mere knife-like edge in cross-section, others being stout and thickened, up to as much as two millimetres.

The surface, where exposed in the round, seems to be quite devoid of sculpture. The tube walls are composed of calcite, with here and there a calcite infilling. It follows that great alteration and replacement must have gone on subsequent to the original fossilisation; this is borne out by the condition of the wood, to be referred to later. The late Dr. Gwyn Jeffreys says the sheath or tube of *Teredo* in the recent state is destitute of anything like true structure, and only composed of minute calcareous particles agglutinated together. In the great *Kuphus arenarius*, on the other hand, the sheath exhibits a prismatic crystalline structure, and in a figure given by Mr. J. Griffith the prisms are seen to be arranged in concentric rings. Dr. G. Johnston says the prisms are short and perpendicular to the surface.

Similar large *Teredo*-like tubes have been described from Cretaceous rocks. Stoliczka figures one, *T. crassula*, from the Ootatoor

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8 Griffith—Loc. cit., pl. x., fig. 4.
Group, boring wood, but in this case the valves of the shell were
discovered, an advantage I have not possessed.

Another species, larger than Stoliczka's *T. crassula* is the huge
*T. pugetensis*, White, from the Puget Group of Western America,
probably of uppermost Cretaceous age. This was also found in
wood, and although the valves were not seen, every probability
exists that it is a true *Teredo*, closely akin to the Queensland
form. The sheath diameter of the two is almost the same.

In an excellent article on *Teredo* and its work, by Mr. A. M.
Snow, the latter says, speaking of course of the living forms:—
"The largest diameter ever noticed by the author measured 1½
ins. . . . After the *Teredo* has penetrated the wood for a little
distance, the diameter remains about constant." He adds that
a large size indicates a warm climate.

The Queensland fossil may be known as *Teredo vastitae*.

An examination of the wood by means of thin sections prepared
for the microscope, has not yielded the satisfactory results expected.
In the first place two facts are established—(1) The wood had clearly
undergone long maceration in water previous to fossilisation, pro-
ducing a half rotten condition; (2) the trunks also underwent
considerable lateral pressure, as evinced by the broken up state
of the tissues. The latter are impregnated with iron oxide and
some silica. All that I can venture to affirm at present is the
Coniferous nature of the wood, but whether Araucariiform or
Cupressiniform must remain for future and better material to
decide. The evidence obtainable from transverse and tangential
sections is sufficiently conclusive on the first point, but the radial
sections do not afford sufficient data to warrant the drawing of a
hard and fast conclusion on the second. In transverse sections,
notwithstanding the disabilities already mentioned, the walls and
cavities of the woody fibres are exhibited in regular quadrangular
spaces, with a one-inch objective, also the medullary rays and some
resin ducts. In tangential sections, the vertical walls and spaces
of the woody fibres are quite apparent, and so are the transverse
sections of groups of medullary rays, with the parenchymatous
cells uniserial and variable in number in the different groups, the
latter being very abundant. All my radial sections, and many
have been made, are a failure from an anatomical point of view
for reasons already given; all that can be distinguished is a mass
of badly preserved and crushed woody fibre. So much depends
on the radial section in the differentiation of Coniferous woods,
that I am afraid I can do no more than suggest that, granting a
Coniferous nature, this wood may be either Araucariiform or

viii.
13 *Vastitas*, an empty place, waste, or desert, in allusion to the locality.
Cupressiform. I had hoped in connection therewith to have solved a problem that has been before me for some time. It is this:—
In 1883, the late Baron F. v. Mueller described wood from the auriferous Pliocene drifts of Haddon, Victoria, and assumed it to be that of his previously described fruits, *Spondylostrobus smythii*, simply because the latter were believed by him to be Cupressiform, and found in the same deep-lead drifts as the wood in question. Subsequently Von Mueller seems to have forwarded to Leipzig, Cupressiform wood from the auriferous drifts of Ballaarat. This Schenk figured under the name of *Phyllocladus mulleri*. Now, are these woods one and the same? Schenk says that in *Phyllocladus* the large oval pores on the parenchyma cells of the medullary rays are inclined to the left, but in Von Mueller’s figure of the supposed *Spondylostrobus* wood the same pores are represented as circular, but no special reference is made to them in the text. Have we one or two Cupressiniferous woods in our Pliocene or Miocene Gold-drifts? Neither of these woods has ever been traced to its original source *in situ*, with any degree of certainty. Still, there is the bare possibility, now that we know definitely of the existence of Coniferous wood in Lower Cretaceous times in Australia, that the logs found in the gold drifts of Upper Tertiary age may be a remnant of Cretaceous denudation.

Finally, it may not be amiss to offer a few conclusions that the discovery of these trunk blocks lead to:—(1) The existence of a vigorous growth of Coniferous trees in Eastern Australia during Cretaceous times; (2) the existence of an arm of the sea with such trees flourishing on its shores, or a river of water-way down which they were floated; (3) immersion for a lengthened period under such conditions as would allow the necessary degree of salinity to exist in the water concomitant with the life of *Teredo*; (4) existence of a warm climate.

Scattered pieces of wood have been found at different times throughout the Rolling Downs Formation, and recorded, whilst a fairly vigorous growth of vegetation may also be inferred from the occurrence at various localities of thin seams of coal—as for instance on the Upper Flinders River, near Hughenden; on Ayrshire Downs; at Winton; Malta, near Tambo; head of Bungeworgorai Creek, near Mitchell; and at Dulbydilla. These are all localities in the Lower Cretaceous of Queensland.

The blocks were collected by Mr. W. H. Blomfield.

12 Schenk—Zittel’s *Handb. Pal.*, ii. Abth., Palaeophytologie, pp. 872-874, f. 424-425. The usual havoc is played with our geography, for Ballaarat is said to be in New South Wales!
13 Snow says that a large size in *Teredo* is due to a warm climate (*loc. cit.*, p. 188).
For the microscopic sections of the wood I am indebted to Messrs. P. Crawford and H. Gooch, of the Geological Laboratory, University of Sydney.

2. The Occurrence of Pholadomya.

Genera Pholadomya, G. B. Sowerby, 1823.
(Genera of Shells, No. 19).

Pholadomya terra-regina, sp. nov.
(Fig. 21).

Sp. Char.—Cast transversely elongate, oblique, inequilateral in the extreme, apparently equiva?e, attenuating in thickness posteriorly. Cardinal margins straight, with a short circumscribed false area. Ventral margins obliquely rounded from beneath the umbones downwards, swelling out at a point slightly posterior to the middle. Anterior ends practically absent. Posterior ends (imperfect in specimen), but probably narrow and obtusely pointed, judging by the lines of growth; greatest convexity of the valves immediately posterior to the umbones; posterior slopes somewhat flattened; diagonal ridges rounded. Umbones absolutely anterior, terminal, incurved, contiguous, and depressed. Sculpture of concentric rugae bearing finer parallel lines, the former separated by valleys of equal width, the valves crossed diagonally, in the centre only, from the umbones to the ventral margins by a few equal
and regular costre, the points of intersection with the ruge showing
signs of small tubercles or nodes.

Obs.—The previous occurrence of Pholadomya in our Continental
Secondary rocks depends on the identification by the late Mr.
Charles Moore18 of a European species (P. ovalum, Ag.), in the
Oolite of Western Australia, and a debatable form figured by Mr.
R. Etheridge19 from the Cretaceous of Gordon Downs, Queensland,
without specific name.

The present species is of a very peculiar type, what with its
transversely elongated outline, depressed beaks, straight cardinal
margin, and want of an anterior end. The absence of an anterior
end, strictly speaking, and the oblique antero-ventral outline are
features seen in such Pholadomya as P. tenuissima, Ag., P. decorata,
Ag., P. cancellata, Ag., and so on. Strange to say, although P.
terra-reginae is undoubtedly from our Cretaceous beds, the outline
is far more like two Infra-Liassic species—P. tagenalis, Schaff.,
and P. lariana, Stop.,20 than it is to the generality of Cretaceous
forms. In the two species figured by Stoppani, the anterior end
appears to be wanting, as in our fossil, but the valves are devoid
of costre. To some extent there is a likeness to P. rostrata,
Matheron, as figured by Zittel,21 from the Gosau series, and P.
depacta, Hamlin,22 from the Syrian Cretaceous, but in both instances
an anterior end, more or less, exists, and the entire surface is
costate. Dr. M. A. Blanckenhorn figures another Syrian species to
which P. terra-reginae is somewhat allied—P. pedernalis, Roemer,23
in so far as the absence of an anterior end and the presence of
nodulated costre on the centre of the valves, but lacking the
longitudinal extension of the valves seen in our species. In form
and obliquity the British Lower Greensand species, P. martini,
Forbes,24 is allied, but again differs in the presence of an appreci­
able anterior end.

The cardinal or dorsal aspect of our specimen is worn, but I
believe a circumscribed area of limited extent existed.

The specimen was collected and presented by Mr. W. H.
Blomfield.

The sketches are by Mr. C. Hedley.

iii, f. 4 - 7.
21 Zittel—Bivalven Gesangebilde Nordöst. Alpen, 1864, 1 Theil, pl. ii.,
f. 2 a - c.
Blanckenhorn—Beitäge zur Geol. Syriens : Entwicklung Kroid. Mit.-Nord-
Syrien, 1890, pl. v., f. 12 a - b.
EXPLANATION OF PLATE XXXIV.

_Teredo vastitas_, Eth. fil.
Mature individuals boring wood.
About two-fifths natural size.
EXPLANATION OF PLATE XXXV.

*Teredo vastitas*, Eth. fil.
Young individuals boring wood.
About two-fifths natural size.