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ROYAL SOCIETY OF SOUTH AUSTRALIA.

THE

CRETACEOUS MOLLUSCA

OF

SOUTH AUSTRALIA

AND THE

NORTHERN TERRITORY.

BY

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(CURATOR OF THE AUSTRALIAN MUSEUM, SYDNEY, NEW SOUTH WALES).

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THE CRETACEOUS MOLLUSCA

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SOUTH AUSTRALIA AND THE NORTHERN TERRITORY.

By R. ETHERIDGE, JUNR.,

Curator of the Australian Museum, Sydney.

I.—INTRODUCTION.

THE fossils described in this Memoir were entrusted to me for elucidation by the late Prof. Ralph Tate and Mr. H. Y. L. Brown, and have been in my possession for some considerable time. Until a comparatively recent date circumstances prevented my giving to them little more than casual attention. Prof. Tate's collection appears to have been obtained from a variety of sources, chiefly, I believe, in the form of specimens sent to him for determination by or as gifts from correspondents and friends scattered over Central South Australia. Those forming Mr. Brown's collection, on the other hand, were principally gathered during his official geological tours throughout the State.

My task was on the point of completion, and, in fact, I was in communication with Prof. Tate as to the form of publication when the sad news of his death reached me. I had hoped to profit by my old friend's kindly criticisms whilst the MS. was passing through the press, but the same great power that brought into being these ancient remains ordained otherwise. All I can now do is to render to his memory the same grateful expressions as would have been tendered to him in life.

The indebtedness I owe to my similarly old friend and at one time colleague and fellow worker, Henry York Lyell Brown, is equally great. The consistent manner in which he has for many years past placed his gatherings at my disposal for study has been to me no less gratifying than flattering.

In the absence of assistance of this kind, my knowledge ot Cretaceous Life in Australia, limited as it even now is, would have been far less, in fact, confined to that of

the organic remains of the period in question as developed in Queensland and New South Wales.

The first portion of the Memoir is devoted to a brief chronological sketch of Cretaceous Palæontology as it relates to South Australia, and the second part to the description of the species contained in the collections named. The work has been in many instances lightened by the cordial assistance in the loan of specimens for comparison by Mr. W. H. Rands, Government Geologist of Queensland, Mr. George Sweet, of Brunswick, Melbourne, and Mr. E. F. Pittman, Government Geologist of New South Wales. To these gentlemen my thanks are now tendered.

II.—PALÆONTOLOGICAL HISTORY.

1863. The first records I can find of the discovery of Mesozoic [Cretaceous] fossils within the boundaries of South Australia are those given by the late Mr. F. G. Waterhouse in his "Report . . . on the Fauna and Flora, Natural History, and Physical Features of Australia, on the line of J. McD. Stuart's Route across that Continent from the South to the North Coast."* *Inter alia.* he says :—"I was fortunate to find in the vicinity of the Gregory and Welcome Springs, in small portions of argillaceous rock, which here and there crop out on the surface of the plain, some fossil wood and shells. The shells are marine shells, and consist of mussels and three other species of bivalves." Again, at Mount Hamilton, Mr. Kekwick "had found fossil mussel shells." On the banks of Chambers Creek he refers to a "marine argillaceous deposit containing numerous marine fossil shells." Near the base of Mount Beresford he "found in some detached portions of an argillaceous rock some fossil marine mussel shells;" and, lastly, Mr. Jarvis and his stockmen "were kind enough to collect for me some valuable . . . . fossils from the vicinity of Mount Margaret." These localities are all on the south-western and western side of Lake Eyre. One of the shells collected at Gregory Creek was afterwards named by the late Mr. Charles Moore *Cytherea Clarkei.*†

This report is referred to by Prof. R. Tate in his "Presidental Address," delivered to the Royal Society of South Australia on October 7th, 1879.‡ He remarked—"Seventeen years have elapsed since the above observations were made, and so far as I can ascertain the enquiry has not advanced one iota. An examination of the specimens has proved that they belong to species forming part of the small Jurassic fauna made known to me through the collections forwarded by Mr. Canham, of Stuart's Creek. From the vicinity of the Peake I have received from Mr. Canham Belemnites and other Jurassic species identical with those at Stuart's Creek. Of the fossils which admit of specific determination, five occur in Queensland, whilst one only is referable to a Western Australian species."

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* S. Austr. Parl. Papers, 1863, ii., No. 125, pp. 2, 3, and 4. † Quart. Journ. Geol. Soc., 1870, xxvi., p. 251.
‡ Trans. Phil. Soc. S. Austr. for 1878-79 (1879), ii., p. xlix.

"List of Jurassic Fossils from Central Australia":—

Belemnites australis, *Phillips**
Belemnites Canhami, *Tate* (*m.s.*)
Natica variabilis, *Moore*
Monotis Barklyi, *Moore*†
Modiola unica, *Moore*‡
Modiola sp.
Cytherea Clarkei, *Moore*
Cytherea, or Chione spp., in casts§
Rhynchonella variabilis, *Moore*"‖

1877. In his paper¶ "On a New Species of *Belemnites* and *Salenia* from the Middle Tertiaries of South Australia," Tate remarked as follows:—"I have a Belemnite from the interior of this Province which resembles *B. gingensis* of the European Oolite . . . . and a new species allied to *B. Australis*, Phillips,** obtained with other Jurassic (?) fossils from Stuart's (formerly Cooper's) Creek, on the line of the transcontinental telegraph."

1880. The first of the two Belemnites referred to above was in this year described by Tate,†† "Description of a New Species of *Belemnites* from the Mesozoic Strata of South Australia" as *B. Canhami*, after Mr. J. Canham, the collector. The specimens were obtained in the bed of the Wood-duck Creek, near the Peake, Central Australia, and were accompanied by examples of *Monotis Barklyi*, Moore, sp.‡‡ and *Cytherea Clarkei*, Moore.

In a short communication published during the same year, "Rock Formations and Minerals in the Vicinity of Peake, Central Australia,"§§ Tate referred to the Jurassic, a dense grey earthy limestone from the Peake, containing the following fossils collected by Mr. J. Chandler:—*Cytherea Clarkei*, Moore; *Monotis Barklyi*, Moore; *Pleuromya*, sp.; and, again, from Cootanoorina, casts of *Cytherea Clarkei*.

1882. A further short communication appeared from Prof. Tate during this year, "Jurassic Fossils from Central Australia,"‖‖ in which he recorded the following species:—

Avicula Barklyi, *Moore*¶¶ from the bed of the Peake Creek.

Avicula corbiensis, *Moore****
Belemnites, n. sp.†††
} Primrose Springs.

Natica variabilis, *Moore*
Avicula Barklyi, *Moore*¶¶
Corbula, n. sp.§§§
Chione ? sp.‖‖‖
} Shelly black limestone from the Peake.

Avicula corbiensis, *Moore****—Three much worn specimens from close to Lake Eyre.

The collectors were Messrs. J. Chandler and J. Canham.

1883. From a deposit at the depth of one hundred feet from the surface, probably a well-sinking on "Sturt's Stony Desert," close to the Grey Ranges, the late Prof. W. J.

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* *Belemnites oxys*, Ten Woods.
† *Maccoyella Barklyi*, mihi.
‡ *Modeola Tatei*, mihi.
§ Not seen by me.
‖ *Rhynchonella Eyrei*, mihi.
¶ Quart. Journ. Geol. Soc., 1877, xxxiii., p. 258.
** Subsequently named *B. eremos*, Tate.
†† Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 104.
‡‡ *Maccoyella Barklyi*, mihi.
§§ *Ibid*, p. 179.
‖‖ Trans. R. Soc. S. Austr. for 1880-81 (1882), iv., p. 149.
¶¶ *Maccoyella Barklyi*, mihi.
*** *Maccoyella corbiensis*, mihi.
††† I cannot identify this in Tate's collection.
§§§ I have not seen a *Corbula* in Tate's collection.
‖‖‖ This specimen has not come under my notice.

Stephens,* M.A., received a few fossils which he referred to as *Ammonites biflexuoides*, *Belemnites*, and other Mollusca. What species of Ammonite this name is intended to record it is now quite impossible even to conjecture.

1884. In this year appeared the first systematic description of South Australian Mesozoic fossils, "Notes on some Mollusca from South Australia, obtained near Mount Hamilton and the Peak[e] Station,"† by Mr. W. H. Hudleston. The author states that the first locality is twenty miles south-west of Lake Eyre, and the latter forty miles south-west of the Peake. Mr. Hudleston credits me with suggesting a Cretaceous age for these fossils, and says "this is by far the most probable conjecture." The explanation of this is very simple, for at the date in question I was engaged in the elaboration of the Mesozoic fossils collected by Dr. R. L. Jack and his colleagues in Queensland. These, following the lead of Mr. R. Etheridge, F.R.S.,‡ I ascribed to the Cretaceous, and was struck by the strong resemblance those in the hands of Mr. Hudleston bore to the former. The following is Mr. Hudleston's list:—

Natica, sp.‖
Myacites (?) australis, *Hudl.*§
Cytherea woodwardiana, *Hudl.*
Cyprina (?) sp.¶
Modiola linguloides, *Hudl.***
Gervillia angusta, *Hudl.*¶
Avicula orbicularis, *Hudl.*††

The collector was Mr. H. Y. L. Brown, who presented the fossils to the Natural History Museum, London.

In the same year Mr. H. Y. L. Brown gave an interesting "Outline of [the] General Geology [of South Australia]"‡‡ Under the "Mesozoic Period—Cretaceous and Oolitic Ages," he referred to the discovery of fossils at a depth of eleven hundred feet in the Tarkaninna Bore, on the Clayton River, about fifty miles north of Government Gums. A short list of fossils of the formation in general, chiefly generic, is given, including *Panopæa plicata*§§ from Mount Eba, and *Avicula Barklyi*‖‖ from Cootanoorina.

1885. Under the title "Fossils from near Mount Hamilton and Peak[e],"¶¶ Professor Tate reviewed Mr. Hudleston's paper already referred to. He remarked—"The new material does not help to the solution of the question of the age of our Mesozoic beds, and it will be well to hold to my opinion that they are Jurassic, as the fauna has slight community of species with the Jurassic rocks of West Australia, and none at all with the Queensland Cretaceous." It has always been a puzzle to me why my late friend so persistently maintained a Jurassic, as against a Cretaceous age for the South Australian fossils. As a matter of fact the "community of species" was just the other way about, none at all with the West Australian, and a good deal with the Queensland species.

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* Proc. Linn. Soc. N.S. Wales, 1880, viii., Pt. 2, p. 281.
† Geol. Mag., 1884, i. (3), p.p. 339-342, t. 11.
‡ Quart. Journ. Geol. Soc., 1872, xxviii., pp. 338-346.
‖ *Natica variabilis*, Moore.
§ *Glycimeris rugosa*, mihi.
** *Mytilus inflatus*, Moore.
¶ I have not met with this shell.
†† *Pseudavicula australis*, mihi.
‡‡ Annual Report of the Government Geologist for South Australia, Dec. 1882-Dec. 1883. *S. Austr. Parl. Papers*, 1884, No. 33, p. 10.
§§ Possibly *Glycimeris rugosa*, mihi.
‖‖ *Maccoyella Barklyi*, mihi.
¶¶ Trans. R. Soc. S. Austr. for 1883-84 (1885), vii., p. 75.

1886. The first of the Rev. W. Howchin's excellent papers on Cretaceous Microzoa now appeared—"On the Fossil Foraminifera from the Government Boring at Hergott Township, with General Remarks on the section, and on other forms of Microzoa obtained therein."* As the Foraminifera are without the scope of this paper, I refer the reader to Mr. Howchin's descriptions.

1887. About this time a further small collection of fossils from Central Australia reached Prof. Tate's hands, and were referred to as a "List of Fossil Mollusca collected by Mr. [Gavin] Scoular at Davenport and Humphrey Springs."† We find recorded :—

Belemnites australis, *Phillips.*‡
Monotis Barklyi, *Moore*, sp §
Modiola linguloides, *Hudleston.*‖
Modiola Scoulari, *Tate.*¶
Modiola, sp.**
Trigonia, sp.—"neither *T. mesembria*, T. Woods, nor *T. nasuta*, Etheridge.††"
Arcomya, sp ‡‡
Pleuromya, sp.‡‡
Cytherea (?) Clarkei, *Moore.*§§
Cypricardia, sp.‖‖

And a number of Microzoa, chiefly Foraminifera, determined by Mr. Howchin.

A very useful paper was contributed in the same year by the late Mr. Gavin Scoular himself—"Sketch of the Geology of the Southern and Western Parts of the Lake Eyre Basin.¶¶ He noted the discovery of "fossil shells of secondary age" at Davenport Springs, near Humphrey Springs, and at the Margaret River. Mr. Scoular further obtained clay from a bore five or six miles above the William Spring, on Anna Creek Station, which yielded the Foraminifera determined by Mr. Howchin.

1889. During this year Mr. H. Y. L. Brown made a Report on the "General Geology of the Route from Hergott to Alice Springs and Hale River."*** He says that over the Cretaceous clay plains and table lands forming what are known as stony downs, "the banks and escarpments of clay and shale with gypsum are often fossil-bearing, particularly where rounded lumps and masses of brittle limestone occur, in which, as a rule, they are imbedded."

Mr. Brown also contributed a paper to Section C at the first meeting of the Australasian Association for the Advancement of Science—"The Mesozoic Plains of South Australia (South of Lat. 26°)."††† He mentions an Ammonite, about two inches in diameter, from Primrose Springs.

This paper was followed by one from Prof. Tate—"On the Age of the Mesozoic Rocks of the Lake Eyre Basin."‡‡‡ Says the author, "where specific identities are possible, the fossils of the Lake Eyre basin are, for the most part, constituents of the Wollumbilla fauna, whilst a few are common to the Maryborough beds." He admitted the Cretaceous age of these

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* Trans. R. Soc. S. Austr. for 1884-85 (1886), viii., p. 79.
† *Ibid* for 1885-6 (1887), ix., p. 53.
‡ *Belemnites oxys*, Ten. Woods.
§ *Maccoyella Barklyi*, mihi.
‖ *Mytilus inflatus*, Moore.
¶ *Mytilus rugocostatus*, Moore.
** Not identified by me with certainty.
†† Not included in the collection examined by me.
‡‡ Not seen by me.
§§ *Cyprina*, mihi.
‖‖ *Isocardia* (?) *Tatei*, mihi.
¶¶ Trans. R. Soc. S. Austr. for 1885-86 (1887), ix., p. 39.
*** Report on a Journey from Adelaide to Hale River. *S. Austr. Parl. Papers*, 1889, No. 24, p. 6.
††† Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 241.
‡‡‡ *Ibid*, p. 228.

fossils, and said, "relying on Mr. Moore's determinations, I have persistently advocated the Jurassic age of the Lake Eyre fossils; but forced to abandon that position by the more decided Cretaceous facies of recently acquired species," &c. This admission speaks for itself. The following is the complete list:—

Crioceras australe, *Moore.*
Belemnites australis, *Phillips.**
Belemnites Canhami, *Tate.*
Belemnites Selheimi, *Ten. Woods.*
Belemnites eremos, *Tate.*
Cinulia Hochstetteri, *Moore*, sp.
Natica variabilis, *Moore.*
Dentalium arcotinum, *Forbes.*†
Avicula Barklyi, *Moore.*‡
Avicula umbonalis, *Moore.*§
Avicula corbiensis, *Moore.*‖
Aucella hughendenensis, *Etheridge.*
Cytherea Clarkei, *Moore.*¶
Cytherea woodwardiana, *Hudleston.*
Gervillia angusta, *Hudleston.***
Mytilus inflatus, *Moore.*
Mytilus rugocostatus, *Moore.*
Myacites McCoyi, *Moore.*††
Myacites rugosa, *Moore.*‡‡
Nucula quadrata, *Etheridge.*
Nucula truncata, *Moore.*
Pecten psila, *Ten. Woods* §§
Trigonia nasuta, *Etheridge* ‖‖
Trigonia lineata, *Moore.*
Lingula subovalis, *Davidson.*

1890. Mr. Hudleston's second paper on South Australian fossils appeared this year—"Further Notes on some Mollusca from South Australia."¶¶ Herein are described the following species, which the author "regarded as of Cretaceo-Jurassic age":—

Ammonites fontinalis, *Hudleston****
Alaria, or Anchura, sp.†††
Turbo (?) sp.**
Actæon, or Avellana, sp.‡‡‡
Pecten, sp.§§§
Pseudavicula anomala, *Moore*, sp.
Pinna australis, *Hudleston*
Mytilus, sp.
Mytilus linguloides, *Hudleston*
Modiola subsolenoides, *Hudleston*‖‖‖‖
Thracia primula, *Hudleston*¶¶¶

1892. In a "Report on Country in the Neighborhood of Lake Eyre,"**** Mr. H. Y. L. Brown gives some interesting details of the various springs around the southern portion of the lake. At Fred's Springs one of the features "is the prevalency of domes of dense limestone, having a septarian structure. These domes and irregular masses are often largely composed of marine fossils of Cretaceous age." Fossiliferous limestone domes are also stated to occur at Finniss Springs, &c.

1893-94. The Rev. Mr. Howchin's further studies of our Cretaceous Foraminifera were published during these years. In 1893 appeared "Notes on the Government Borings

* *Belemnites oxys*, Ten. Woods.
† *Dentalium wollumbillaensis*, mihi.
‡ *Maccoyella Barklyi*, mihi.
§ *Maccoyella umbonalis*, mihi.
‖ *Maccoyella corbiensis*, mihi.
¶ *Cyprina Clarkei*, mihi.
** Not seen by me, an unrecognisable fragment.
†† *Glycimeris McCoyi*, mihi.
‡‡ *Glycimeris rugosa*, mihi.
§§ *Pecten* (*Syncyclonema*?) *socialis*, mihi.
‖‖ *Trigonia cincta*, mihi.
¶¶ Geol. Mag., 1890, vii. (3), p. 241, t. 9.
*** *Amaltheus olene* (juv.), mihi.
††† *Anchura Wilkinsoni*, mihi.
‡‡‡ *Cinulla depressa*, mihi.
§§§ *Protamusium* (?) *gradatum*, mihi.
‖‖‖ Not seen by me.
¶¶¶ *Corimya primula*, mihi.
**** S. Austr. Parl. Papers, 1892, No. 141, p. 2.

at Tarkaninna and Mirrabukinna, with special reference to the Foraminifera observed therein,"* and in 1894 "A Census of the Fossil Foraminifera of Australia."† In the latter a complete list of our Cretaceous Foraminifera known to that time is given.

1895. This list was, however, added to in 1895 by the description‡ of two new forms from Hergott Springs Bores, Nos. 1 and 2.

During this year the discovery of Cretaceous fossils in the Northern Territory was reported by Mr. H. Y. L. Brown§ These were found on the beach at low water mark below Point Charles Lighthouse, Port Darwin. He remarked, "Fossils, entirely composed of iron ore (limonite) are found on the beach at low water, having doubtless been washed out by the action of the sea from a fossiliferous bed below high water mark," and casts of Belemnites were obtained from a horizontal shale capping the cliff section of the Hospital, Port Darwin, and between East Point and Fanny Bay.

About the same time Prof. Tate exhibited to the Royal Society‖ "two species of Ammonites showing some affinity to the Cretaceous species *A. varicosus* of Europe. They were given to Dr. [E. C.] Stirling when at Palmerston in 1891 as coming from that place."

It is quite possible that these Ammonites came from the same beds yielding Mr. Brown's fossils. I furnished a preliminary report¶ on the latter, and recognised two species of *Ammonites*, a fragment of an *Ancyloceras* or *Hamites*, a *Scaphites*, an *Aucella*, differing from our Lower Cretaceous *A. hughendenensis*, a *Nucula*, and reptilian bony scute-tubercles. I remarked also on their peculiar condition of fossilisation, a conversion into iron oxide with a highly-glazed and shining surface. The specimens are all small, and a point of some interest occurs in connection therewith. Are they mature examples of species so far undetermined in our Cretaceous series or a dwarfed race of species already known? I am inclined to the former opinion. *Scaphites* and *Hamites* were not previously known to occur in Australia, the *Aucella* is certainly distinct from the hitherto known species, and the *Ammonites* and *Ancyloceras* are probably so. Previous to the arrival of these fossils I was not acquainted with any possessing a similar physical appearance from other horizons in our Cretaceous beds. The general facies of the fossils, however, leads me to regard them as of Lower Cretaceous age, and it was so stated in the report in question. The Belemnite casts from below the Hospital occur in a pure white silicious rock slightly shaley in nature, and present a close resemblance to similar casts in the altered and hardened Upper Cretaceous shale at Maryborough, Queensland.

In this brief chronological summary I have endeavored to give an outline of the rather sparse bibliography of South Australian Cretaceous Palæontology. One other collection yet remains to be examined—that made a few years ago by Mr. George Sweet in the Lake Eyre Basin.

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* Trans. R. Soc. S. Austr. for 1892-93 (1893), xvii., Pt. 2. p. 346.

† Proc. Austr. Assoc. Adv. Sci. for 1893 (1894), v. p. 362.

‡ Trans. R. Soc. S. Austr. for 1894 (1895), xix., Pt. 2, p. 198.

§ Report of the Government Geologist on Northern Territory Explorations—*S. Austr. Parl. Papers*, 1895, No. 82, p. 6.

‖ Trans. R. Soc. S. Austr. for 1894 (1895), xix., Pt. 2, p. 262.

¶ S. Austr. Parl. Papers, 1895, No. 82, p. 33.

III.—DESCRIPTION OF THE SPECIES.

BRACHIOPODA.

GENUS LINGULA, *Bruguière*, 1791.

(Encyclop. Méthodique, i., pl. 250, f. 1.)

Lingula subovalis, *Davidson.*

(Pl. i., fig. 1.)

Lingula ovalis (Sby.) or *L. subovalis* (Dav.), Moore, Quart. Journ. Geol. Soc., 1870, xxvi., pp. 236 and 240.

Lingula subovalis (Dav.), Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Lingula ovalis, Eth. fil., Geol. and Pal. Q'land., 1892, p. 444, t. 20, f. 14.

Obs.—Prof. Tate's collection contains two examples, neither perfect, that do not appear to differ from those found so plentifully in the Maranoa and Wollumbilla beds in Queensland.

Loc.—The Peake, Central South Australia (*Tate*), and Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS RHYNCHONELLA, *Fischer*, 1809.

(Notice Foss. Gouv. Moscou, 1809, p. 35.)

Rhynchonella Eyrei, *sp. nov.*

(Pl. i., fig. 2.)

Sp. Char.—Shell triangular; dorsal margin arched; lateral margins rounded; ventral margin feebly sinuated, with the front rather straight-walled, bold, and with several well marked frill-imbrications. Dorsal valve longitudinally convex, but transversely depressed in the middle, with little or no differentiated fold, which is chiefly perceptible by reason of the arrangement of the costæ; septum extending for about half the length of the valve. Ventral valve but little convex, almost becoming flattened, with a feeble sinus, except at the immediate front; umbo high, acute and projecting. Costæ prominent and coarse, 3-4 on the fold, 2-3 in the sinus, and 3-4 on either flank in both valves, crossed by numerous concentric frill-laminæ, more noticeable towards the front.

Obs.—This form has much in common with the shell from the Oolitic beds of Western Australia, identified by Moore as *R. variabilis*, Von Schl.; the number of costæ and the flattened fold are identical in both. It is very questionable if the Oolitic form be *R. variabilis*, for Tate observes* that Moore's species differs from the true *R. variabilis*, of the German Jura, by its depressed median area; in this I agree with him.

Rhynchonella Eyrei appears to be an ally of *R. Walkeri*, Davidson,† from the Middle Neocomian of Tealby, the likeness being chiefly in the depressed fold of the dorsal valve, and the limited number of costæ.

* Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 229. † Brit. Foss. Brachiopoda, 1874, iv., pt. i., p. 68, t. 8, f. 33 & 34.

Rhynchonella croydonensis, mihi,* is only known as internal casts and external impressions in the coarse grit of the Croydon Goldfield, but my impression is that it is a much wider, and flatter form than the present species. If the specimen I formerly figured as the dorsal valve† of *R. croydonensis*‡ be so, and I see no reason to doubt it, then the two forms are certainly distinct. I have seen four examples of *R. Eyrei*, all similar in size.

Loc.—Lake Eyre Basin (*Tate*); Cootanoorrina, thirty to forty miles west of the Peake, Central South Australia (*Brown*); Beresford Springs, Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate, Brown, and Mining Geological Museum, Sydney.

PELECYPODA.

GENUS PECTEN, *O. F. Müller*, 1776.

(Zool. Danicæ Prod., 1776, p. xxxi.)

Pecten, *sp. ind.*

(Pl. i., fig. 13.)

Obs.—A fragmentary shell consisting of a portion of the left valve with, comparatively speaking, a very large anterior ear, the outer margin of which is slightly sigmoidal. On the body of the shell there are faint traces of concentric lamellæ, as in *Syncyclonema (?) socialis*, and the ear carries very numerous and fine radiating striæ, crossed by slightly sigmoidal lines of growth. The specimen is interesting as being one of the few Pectiniform shells found in the South Australian Cretaceous.

Loc.—The Peake, Central South Australia (*Tate.*)

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS SYNCYCLONEMA, *Meek*, 1864.

(Smithsonian Miscel. Coll., 1864, No. 177, p. 31.)

Syncyclonema (?) socialis, *Moore, sp.*

(Pl. i., figs. 11 and 12).

Pecten socialis, Moore, Quart. Journ. Geol. Soc., 1870, xxvi, p. 248, t. 11, f. 9.

Pecten psila, Ten. Woods, Proc. Linn. Soc. N.S. Wales, 1883, viii., Pt. 2, p. 239.

Pecten socialis, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 446, t. 21, f. 6, 7, and 9.

Pecten, sp. ind., Eth. fil., loc. cit., t. 21, f. 5.

Pecten æquilineatus, Eth. fil. (*non* Moore), loc. cit., t. 21, f. 8 (*non* p. 445).

Pecten (Syncyclonema ?) socialis, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 13.

Obs.—I only know this species from South Australia by a specimen in the Mining and Geological Museum, Sydney. It represents a nearly full-grown individual, twenty millimetres in length, with the valves in apposition, but almost entirely exfoliated, and the

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* Geol. Pal. Q'land, 1892, p. 560, t. 41, f. 13 and 14. † *Loc. cit.*, t. 41, f. 14. ‡ *Loc. cit.*, t. 41, f. 13.

auricles to all intents and purposes destroyed. One valve is convex, and the other, although convex below the umbo, is in the middle portion of the valve flat, and towards the ventral and ventro-lateral margins concave. In consequence of the exfoliation that has taken place, sculpture is not visible except along the immediate edges of the valves, which are crenulated by the radiating costæ.

Loc.—Primrose Springs, near the Peake, Central South Australia (*Brown.*)

Hor.—Lower Cretaceous.

Colln.—Mining and Geological Museum, Sydney.

GENUS PROTAMUSIUM, *Verrill*, 1899.

(Trans. Connecticut Acad., 1899, xi., Pt. i., p. 71).

Protamusium (?) gradatum, *sp. nov.*

(Pl. i., fig. 14.)

Pecten, sp. ind., Hudleston, Geol. Mag., 1890, vii. (3), p. 244, t. 9, f. 5.

Sp. Char.—Shell compressed, orbicular, nearly equilateral, flattened towards the margins. Hinge short and straight. Auricles triangular, practically equal, the outer margins slightly oblique; auricular sulci as diverging, shallow, concave depressions, widening forwards. Adductor impression sub-central and pitted. Sculpture consists of flattened concentric laminæ, bevelled at the edges, forming a series of low steps or gradations on the surface of the valve, with fine concentric lines faintly apparent on the laminæ.

Obs.—It is difficult, from the imperfection of the specimen, to speak with certainty as to the generic identity of this shell. Whether the valves were closed as in *Pseudamusium*, gaping laterally as in *Amusium*, or concavo-convex in one valve as in *Propeamusium*, it is impossible to say. The absence of a dorsal prolongation of the auricles above the hinge separates it from *Entolium*. As, however, the auricles are certainly slightly elevated along their dorsal margins, like those of *Pecten demissum*, Phill., I place it provisionally in *Protamusium*, Verrill, of which the latter species is the type.

In the "Geology and Palæontology of Queensland," I referred a fragmentary valve to *Amusium*,* and compared it with *A. sulcatellum*, Stolizcka. It consisted of the auricles and umbonal portion, with a sculpture of concentric lines, occupying wider laminæ of growth. The valve was much narrower towards the umbo than in the present instance, the ears comparatively small and triangular, with straight outer margins. The valve of *P. gradatum* is wider than the Queensland fragment, thus still more resembling Stoliczka's species, a likeness intensified by the bevelled edges of the concentric laminæ, a feature that did not present itself in the former.

Soc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Coll.—Tate.

* Geol. Pal. Q'land, &c., 1892, p. 447, t. 21, f. 4, 4a.

GENUS PTERIA, *Scopoli*, 1777.

(Introd. Hist. Nat., 1777, p. 397.)

Pteria Tatei, *sp. nov.*

(Pl. i., fig. 15.)

Sp. Char.—Shell triangular, generally compressed, especially at the posterior end, the margin of which is somewhat truncate. Immediately below the dorsal margin are two long supports posterior to the umbones for the sub-internal ligament, leaving grooves in decorticated examples or internal casts. The muscular impressions consist of two small anterior scars in each valve, high upon the umbonal slopes, and a series of detached dumb-bell-shaped scars leading from the former along the pallial lines; large adductor scars well towards the posterior; intermarginal areas small as compared with the size of the shell.

Obs.—The specimen is partly an internal cast and partly decorticated.

Meek states* that *Pteria* has an obscure anterior tooth, and at times a long posterior tooth in each valve. The anterior end is too ill-preserved to show the anterior tooth with certainty, but there appears to be some indication of it. Below the cardinal margin and on each side is a groove extending the greater part of its length, which is probably the impression left by the decay of a sub-internal ligamentary fulcrum. On the umbonal slope, but hardly within the umbonal cavity, are two small anterior muscle scars, and along the pallial line, in the left valve, are five dumb-bell shaped scars, although less marked in the right valve. No trace of the external shelly-layer remains.

This fragmentary specimen is referred to *Pteria* provisionally, as the evidence for this reference is not wholly satisfactory.

Loc.—Lake Eyre Basin (*Tate.*)

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS MACCOYELLA, *Eth. fil.*, 1892.

(Geol. Pal. Q'land, &c., 1892, p. 451.)

Maccoyella Barklyi, *Moore, sp.*

(Pl. i., figs. 3-7.)

Avicula Barklyi, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 245, t. 11, f. 1 and 2.

Avicula alata, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 342, t. 20, f. 8.

Monotis Barklyi, Tate, Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., pp. 104 and 179.

Avicula Barklyi, Tate, Trans. R. Soc. S. Austr. for 1880-81 (1882), iv., p. 149.

Monotis Barklyi, Tate, Trans. R. Soc. S. Austr. for 1885-86 (1887), ix., p. 53.

Avicula Barklyi (pars), Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

* Rept. U.S. Geol. Survey (Hayden's), 1876, ix., p. 28.

Maccoyella Barklyi, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 455, t. 22, f. 1, 2, 4, and 5, t. 23, f. 1 and 2.

Maccoyella Barklyi, var. *mariæburiensis*, Eth. fil.. Geol. Pal. Q'land, &c., 1892, pp. 456 and 563, t. 22, f. 3, t. 42, f. 4-6.

Pseudavicula (?) alata, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 563, t. 24, f. 14.

Obs.—This appears to be rather a common species in the Lake Eyre Basin, Mr. Brown having obtained a number of specimens around the south shore of Lake Eyre. Two of these are remarkably well preserved, the smaller of the two displaying the umbo of the left or convex valve in great perfection, arching and curving over the cardinal margin, its immediate apex sharp and finely pointed. The larger specimen (Pl. i,, figs. 3 and 4) exhibits the scobinate lamellæ at the anterior end of the cardinal margin in the left valve, remarkably strong and upstanding. The chondrophoral button in the right valve is relatively large for the size of the shell, relatively larger indeed than in *M. reflecta*. The adductor scar in the left valve is either oval or subreniform, and is concentrically marked; the longitudinal median line of the scar practically coincides with the position of the second primary costa, counting from the posterior end.

The sculpture of the specimen in question is exquisitely displayed. On the left valve the four or five most posterior primary costæ are stronger than all the others, and bear short fistulose frill-like spines. In the intercostal spaces there is a secondary costa midway between every pair of primary, and every secondary is supported on each side by a tertiary costa. The posterior wing always bears at least one primary costa. It does occasionally happen that all the primary costæ of the left valve bear fistulose spines, and even some of secondary order also. Such a specimen is in the collection of Mr. George Sweet, from the Maranoa River, Queensland. The primary costæ, at any rate, project beyond the ventral margin of the valve as spines. This is seen in one of Prof. Tate's specimens, and has already been figured by me in Queensland examples, with the varietal name of *mariæburiensis* attached. I conceived that this highly spinose condition was typical of the Upper Cretaceous, but I now find that all conditions of the species occur indiscriminately throughout both divisions of our Cretaceous System, and the name may therefore be abandoned.

The whole of the left valve is crossed by broad laminæ of growth and fine concentric close frills. The latter gather into bundles on approaching each primary costa, and describe a V-shaped figure towards the projecting apex of each fistulose spine; these frills are particularly well developed on the posterior wing.

The costæ of the right valve are very numerous, but there is an entire absence of the spinose primaries, all answering to those of the second and third order of the left valve. The same broad laminæ of growth and delicate concentric frills are present.

Loc.—Wood-duck Creek, near the Peake, Central South Australia (*J. Canham*);* bed of Peake Creek, near the Peake, Central South Australia (*J. Chandler*);† Davenport or

* Tate, Trans. R. Soc., S. Aust. for 1879-80 (1880), iii., p. 104.

† Tate, *Ibid* for 1800-81 (1882), iv., p. 149.

Humphrey Springs, Lake Eyre South (*G. Scoular*);* Beresford Springs, Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate and Brown.

Macoyella umbonalis, *Moore, sp.*

(Pl. i., fig. 8).

Avicula umbonalis, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 246, t. 12, f. 2 and 3.

Avicula umbonalis, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Maccoyella umbonalis, Eth. fil., Geol. Pal. Q'land, &c., 1892, pp. 458 and 564, t. 22, f. 6 and 7, t. 23, f. 4.

Maccoyella umbonalis, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 16.

Obs.—A crushed example, consisting of the left valve and the umbonal part of the right in Prof. Tate's collection is referred to this species. The hinge characters of the left valve are fairly well displayed, although the specimen is worn. It is three and three-quarter inches long by four and a half inches in breadth.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—*Tate.*

Macoyella corbiensis, *Moore, sp.*

(Pl. i., figs. 9 and 10).

Avicula corbiensis, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 246, t. 11, f. 7.

Crenatula (?) *gibbosa*, Ethridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 339, t. 19, f. 3.

Avicula Corbiensis, Tate, Trans. R. Soc. S. Austr. for 1880-81 (1882), iv., p. 149.

(?)*Avicula Barklyi*, Ten. Woods, Proc. Linn. Soc. N. S. Wales, 1883, viii., Pt. 2, p. 240, t. 12, f. 6 (excl. f. 4 and 5.)

Avicula corbiensis, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Maccoyella corbiensis, Eth. fil., Geol. Pal. Q'land, &c., 1892, pp. 458 and 563, t. 22, f. 8 and 9.

Maccoyella corbiensis, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 17.

Obs.—Three very much worn examples of this species are in Prof. Tate's collection. No additional information can be gleaned from them.

Loc.—Primrose Springs, Lake Eyre South (*J. Chandler*†); "close to Lake Eyre" (*J. Canham*‡).

Hor.—Lower Cretaceous.

Colln.—Tate.

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* Tate, *Ibid* for 1885-86 ix., p. 53. (1887).

† Tate, Trans. R. Soc. S. Austr. for 1880-81 (1882), iv., p. 149.

‡ *Ibid.*

GENUS GERVILLIA, *Defrance*, 1820.

(Dict. Sci. Nat., 1820, xviii., p. 502.)

Gervillia angusta, *Hudleston.*

Gervillia angusta, Hudleston, Geol. Mag., 1884, i. (3), p. 341, t. 11, f. 5.

Gervillia angusta, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Obs.—I have not seen a specimen of this species. It is recorded by Mr. Hudleston and Prof. Tate, and requires further elucidation.

Loc.—Mount Hamilton, twenty miles south-west of Lake Eyre (South), or forty miles south-west of the Peake, Central South Australia (*Hudleston*); Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London.

GENUS AUCELLA, *Keyserling*, 1846.

(Reise in das Petschora-Land, 1846, p. 297.)

Aucella hughendenensis, *Etheridge.*

Avicula hughendenensis, Eth., Quart. Journ. Geol. Soc., 1872, xxviii., p. 346, t. 25, f. 3.

Aucella hughendenensis et A. Liversidgei, Eth. fil, Journ. R. Soc. N.S. Wales for 1883 (1884), xvii., p. 90, second pl. (top and lower r. h. figs.).

Aucella hughendenensis, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Aucella hughendenensis, Eth. fil., Geol. Pal Q'land, &c., 1892, p. 460, t. 25, f. 1—6.

Obs.—I have not seen a specimen of this species from South Australia. It is recorded by Prof. Tate.

Loc.—Lake Eyre Basin (*Tate*).

Coll.—Tate.

Aucella incurva, *sp. nov.*

(Pl. vii., figs. 22-27.)

Sp. Char.—Shell irregular in outline, but generally elongately and obliquely sub-deltoid, somewhat curved, and produced in a variable degree towards the posterior; plano-convex, or unequally biconvex. Left valve convex, gryphæa-form, produced and attenuated umbonally, somewhat expanded about the middle of the valve, and again narrowed towards the ventral margin; cardinal margin, convexly curved with a wavy uneven edge; umbo produced and incurved, or sometimes twisted. Right valve flat, feebly convex, or partially concave, and more or less oval in outline, flattened on the anterior side; anterior dorsal margin concave; anterior auricle small, triangular, and deeply divided from the valve; no posterior wing, but the posterior margin obliquely subtruncate. Anterior margins of both valves regularly rounded throughout. Surface of both valves ornamented with coarse concentric laminæ, but no trace of radiating costæ or striæ.

Obs.—This is the second form of *Aucella* recognised in our Cretaceous rocks, and is

in some respects peculiar. It is distinct from *A. hughendenensis*, which does not possess the same elevated and attenuated umbo in the left valve, is altogether a more robust shell, and is linear-costate. *A. incurva* is remarkable for its longitudinal tenuity and elongated form, and in some respects is not unlike a *Gryphæa*. The actual contact of the two valves along the cardinal margin seems to be very limited, and confined to their posterior ends. The umbo of the left valve is produced, incurved and sometimes twisted, whilst the dorsal margin of the right valve on the anterior side is decidedly concave.

A. incurva belongs to that section of the genus represented by such narrow forms as *A. Pallasii*, Keyserling,* and *A. Erringtonii*, Meek.† The comparatively recent figures of the former given by Mr. J. Lahusen‡ exhibit a marked resemblance in general to our form, but the umbo of the left valve of the last-named is much more elevated and the anterior ear of the right valve better developed. Furthermore, in *A. Pallasii* the valves are closely apposed along the cardinal margin. Similar points of resemblance and divergence can also be detected in one of Eichwald's specimens§ of this species from the Aleutian Islands. *A. incurva* is distinct from both the species found in the Southern Hemisphere other than *A. hughendenensis*, viz., *A. plicata*, Zittel,‖ from New Zealand, and *A. braziliensis*, White,¶ from Brazil. In some points an ally may be found in the pod-shaped *A. leguminosa*, Stol.,** from the Spiti Shales of Oolitic age in the Himalaya Mountains, but the umbonal region of the left valve has not the produced character of that of *A. incurva*, and the lateral margins of the valves are much too parallel.

Loc.—Beach at Point Charles, Port Darwin (*Brown*).

Hor.—Lower Cretaceous (?).

Colln.—Brown.

GENUS PSEUDAVICULA, *Eth. fil.*, 1892.

(Geol. Pal. Q'land, &c., 1892, p. 449.)

Pseudavicula australis, *Moore*, sp.

(Pl. ii., fig. 2.)

Lucina (?) australis, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 251, t. 14, f. 5.
Avicula orbicularis, Hudleston, Geol. Mag. 1884, i. (3), p. 341, t. 11, f. 10.
Pseudavicula anomala, Hudleston, *Ibid*, 1890, vii. (3), p. 244 (excl. Moore's references).
Pseudavicula australis, Eth. fil., Geol. Pal. Q'land, 1892, p. 451, t. 24, f. 7, 9, 10, 12, and 13.

Obs.—The specimens I have so far seen from the South Australian Lower Cretaceous deposits do not throw any further light on the structure of this species, except that in some

* Reise in das Petschora Land, 1846, p. 299, t. 16, f. 1-7.
† Rept. Geol. Survey California, Geol. i., 1865, p. 479, t. 1, f. 1-5.
‡ Mém. Comité Geol. St. Petersbourg, 1888, viii. No. 1, t. 1, f. 12-14.
§ Geog. Pal. Bemerkungen Halbinsel Mangischlak u.d. Aleutischen Inseln, 1871, t. 4, f. 10, 11.
‖ Reise Osterreichischen Fregatte Novara, Geol. Theil. i., 2 Abth., Pal., Pt. 2, p. 32, t. 8, f. 4 a-c.
¶ Extract Archivos Mus. Nac. Rio Janeiro, vii., t. 3, f. 11-13.
** Mem. Geol. Survey India, v., Art. 1, t. 8, f. 8, 8 a-b.

individuals the adductor scar is less elongate longitudinally than in others. It is either oval in such instances or obscurely deltoid, when the widest diameter of the scar corresponds to that of the shell, the apex of the delta being towards the cardinal margin ; it is concentrically marked.

Mr. Hudleston, in his second paper, referred his previously described *Avicula orbicularis* to *Pseudavicula anomala*, Moore sp. He said, "Mr. Etheridge, jun., is probably right in assuming that *Avicula orbicularis* is a synonym of *Lucina anomala*," Moore. I never published any such opinion, but have consistently believed it to be identical with Moore's *Lucina (?) australis*.

Loc.—Lake Eyre Basin (Tate); Primrose Springs, near the Peake, Central South Australia (Brown).

Colln.—Tate, and Brown.

Pseudavicula anomala, *Moore*, sp.

(Pl. ii., fig. 1.)

Lucina (?) anomala, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 251, t. 14, f. 4.
Pseudavicula anomala, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 251, t. 24, f. 6, 8, and 11.

Obs.—On the surface of a large bore-core, five inches in diameter, are displayed a number of examples of this species matted together. The matrix is a rather soft grey mudstone, and the mode of preservation and agglomeration is very similar to that seen on the calcareous shale of the Maranoa River in Queensland.* It is a smaller and more delicate form than *P. australis*, and highly gregarious. I have not seen any reason to modify my previously expressed opinion that it is specifically distinct from *P. australis*.

Loc.—Bore at Hergott Springs, Central South Australia, one hundred and fifty feet from the surface (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Mining and Geological Museum, Sydney.

Genus Radula, *Klein*, 1753.

(Tent. Meth. Ostrac., 1753, p. 135.)

Radula Randsi, *Eth. fil.*

(Pl. ii., fig. 4.)

Lima (Radula) Randsi, Eth. fil., Geol. Pal., Q'land, &c., 1892, p. 562, t. 21, f. 13.

Obs.—I have little to add to the already published description, beyond the fact that the presence of two specimens from the Lake Eyre beds constitutes this a Lower as well as an Upper Cretaceous species, its horizon in Queensland being the latter only, so far as known.

* Geol. Pal. Q'land, &c., 1892, t. 24, f. 8.

When preserved in limestone and unaffected by alteration, as the Maryborough specimens are, the costæ are seen to be very evenly rounded, and the intervening valleys or inter-costal spaces flat. Prof. Tate referred his specimens to *Lima Gordonii*, Moore,* but if the figure of the latter is correctly drawn the South Australian specimens cannot be it in consequence of the slight posterior alation in *R. Randsi*, and decrease in the number of costæ, which rarely reach as many as fifteen, and are normally twelve only. Those of *L. Gordonii* are certainly eighteen, probably more, and much finer and less prominent.

Loc.—Primrose Springs, east of the Peake, Central South Australia (*Brown*); Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS PINNA, *Linnæus*, 1758.

(Syst. Nat., Ed. x., p. 707.)

Pinna, *sp. ind.*

Obs.—A small elongate *Pinna* in a poor state of preservation occurs in Prof. Tate's collection. It is triangular in section, much exfoliated, and does not exhibit any trace of the numerous radiating costæ, or curvilinear lines of *P. australis*, Hudleston,† but on the portion exposed two radiating costæ only. The cardinal margin is straight, and the ventral but very little curved.

It is possible that the *Pinna*, of which I have already figured a fragment,‡ may be identical with this.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

Pinna australis, *Hudleston.*

Pinna australis, Hudleston, Geol. Mag., 1890, vii. (3), p. 244, t. 9, f. 6.

Obs.—I have not seen a specimen that can be satisfactorily referred to this species.

Loc.—Primrose Springs, east of the Peake, Central South Australia (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London.

GENUS INOCERAMUS (*J. Sowerby*, 1814, m.s.), *Parkinson*, 1819.

(Trans. Geol. Soc., 1819, v. p. 55.)

Inoceramus, *sp. ind.*

(Pl. ii., fig. 3.)

Obs.—When we take into consideration the great abundance of *Inoceramus* in the Lower Cretaceous of Queensland, and comparative abundance in the Upper Cretaceous of Western N.S. Wales, its almost entire absence from the two collections before me is remarkable.

* Quart. Journ. Geol. Soc., 1870, xxvi., p. 247, t. 12. f. 4. † Geol. Mag., 1890, vii. (3), p. 244, t. 9, f. 6.
‡ Geol. Pal. Q'land, &c., 1892, t. 20, f. 16.

The only trace of this genus that has so far come under my notice is a gypseous cast obtained by Mr. Brown, much too imperfect for specific determination. It is three inches in length, with very strongly marked concentric rugœ.

Loc.—Near the Peake, west of Lake Eyre North, Central South Australia.

Hor.—Lower Cretaceous.

Colln.—Brown.

GENUS MYTILUS *(Linnæus), Lamarck, emend.*, 1799.

(Prodrome-Mém. Soc. Hist. Nat. Paris, 1799, p. 88).

Mytilus primulafontensis, *sp. nov.*

(Pl. ii., figs. 22-24.)

Sp. Char.—Shell (cast) transversely elongate, linguloid, slightly wedge-shaped, tumid anteriorly, the convexity lessening rapidly towards the posterior; test thick. Cardinal margins about half the length of the valves; escutcheon comparatively wide. Ventral margins convex, rounding into the posterior margins, which are very oblique above. Anterior margins entire, the byssiferous notch unapparent. Posterior or diagonal slopes prominent, but rounded. Umbones tumid, incurved. Adductor impressions round or slightly deltoid, high in position, close under the cardinal margins.

Obs.—This form is quite distinct from any other species of *Mytilus* met with in the South Australian Cretaceous. It is easily distinguished by its somewhat wedge-shaped or linguloid outline, and the evenly rounded transverse contour. It is most nearly allied to *Mytilus inflatus*, Moore, but when the two forms are placed side by side they cannot be mistaken.

There is no evidence of the existence of a byssal sinus.

Loc.—Primrose Springs, east of the Peake, Central South Australia *(Brown).*

Hor.—Lower Cretaceous.

Colln.—Mining and Geological Museum, Sydney.

Mytilus inflatus, *Moore.*

(Pl. ii., figs. 12-21.)

Mytilus inflatus, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 252, t. 13, f. 4.
Modiola linguloides, Hudleston, Geol. Mag., 1884, i. (3), p. 341, t. 11, f. 6*a* and *b*.
Mytilus linguloides, Hudleston, Geol. Mag., 1890, vii. (3), p. 245.
Modiola linguloides, Tate, Trans. R. Soc. S. Austr. for 1885-86 (1887), ix., p. 53.
Mytilus inflatus, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.
Mytilus inflatus, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 467, t. 25, f. 11 *(excl.* Ten. Woods' ref.).

Sp. Char.—Shell inflated, tumid, more or less shortly wedge-shaped, the tumidity contracting rapidly towards the posterior ventral angles; test thick. Cardinal margins straight, about two-thirds the width of the shell, a little thickened on each edge; escutcheon long

and narrow. Umbones tumid, somewhat eroded, touching, and much incurved or inrolled. Anterior ventral margins gently rounded; byssiferous notch unapparent. Posterior margins obliquely rounded; posterior or diagonal slopes rounded, scarcely distinguishable from the general surface. Adductor scars deltoid, but very slightly impressed, close to the posterior margins, and at about the middle of their length; two or three small umbonal scars present. Sculpture consisting of irregular and inequidistant flat laminæ of growth, with intermediate fine lines.

Obs.—*Mytilus inflatus* is a particularly neat shell as to outline, but very variable in size. Moore figured a short and tumid individual, whilst as *Modiola linguloides* Hudleston depicted a larger and more elongate variety. In 1889 Prof. Tate bracketed these as synonymous, and in 1890 Mr. W. H. Hudleston, in his second paper on South Australian Mesozoic fossils, remarked of his own species—"It may possibly be the same as *Mytilus inflatus*, Moore, but would seem to run larger and to be somewhat more inflated than Moore's species." Prof. Tate's opinion I am now quite prepared to endorse, having, through the courtesy of Dr. Henry Woodward, been able to refresh my memory of Mr. Hudleston's shell by the examination of a carefully prepared reproduction of that gentleman's type deposited in the Natural History Museum, London. The only difference that I can detect is in the greater diagonal length of Hudleston's shell. The relative convexity of the valves and the sculpture are identical.

A very characteristic feature of *M. inflatus* lies in the inrolled condition of the beaks, at once apparent when the united valves are seen in an anterior end view. The valves appear to be quite closed, as I have failed to detect the slightest "gape" for the passage of a byssus, even amongst the large number of specimens examined. There is a marked thickening along the cardinal margin of each valve, and a decided cavity, or escutcheon, for the reception of the ligament; it extends along nearly the whole length of the cardinal margins. The valves are not absolutely smooth, as described by Moore, for fine lines ornament the rather flat concentric laminations of the surface.

I have elsewhere* pointed out the differences that exist between *M. inflatus* and *M. palmerensis*, mihi (=*M. inflatus*, Ten. Woods).

Loc.—Davenport or Humphrey's Springs, Lake Eyre South *(Scoular)*;† Mount Hamilton, twenty miles south-west of Lake Eyre South, or else forty miles south-west of the Peake, Central South Australia (Brown);‡ forty-five miles south-west of Cootanoona Station, Lake Eyre (Brown);§ Springs—Fred's, Finniss, &c., along south shore of Lake Eyre South *(Brown)*.

Hor.—Lower Cretaceous.

Colln.—Tate; Brown; Natural History Museum, London; Mining and Geological Museum, Sydney.

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* Bull. Geol. Survey Q'land, 1901, No. 13, p. 21.

† Tate, Trans. R. Soc. S. Austr. for 1885-86 (1887), ix., p. 53.

‡ Hudleston, Geol. Mag., 1884, i. (3), p. 341.

§ Hudleston, *ibid*, 1890, vii. (3), p. 245. Is this Cootanoorina, thirty to forty miles west of the Peake, Central South Australia?

Mytilus rugocostatus, *Moore.*

(Pl. iii., figs. 1-7.)

Mytilus rugocostatus, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 252, t. 13, f. 2.
Modiola Scoulari, Tate, Trans. R. Soc. S. Austr. for 1885-86 (1887), ix.. p. 53.
Mytilus rugocostatus, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.
? Mytilus, sp., Hudleston, Geol. Mag., 1890, vii. (3), p. 245, t. 9., f. 9.
Mytilus rugocostatus, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 466.

Sp. Char.—Shell ovately-oblong, curved in a greater or less degree, large, convex, most so at about one-third from the umbones; test thick. Cardinal margins slightly curved; escutcheon narrow. Antero-ventral margins sigmoidally curved more or less, the amount varying with the degree of curvature of the cardinal margins; byssal sinus not apparent. Posterior ends broad, sometimes becoming expanded, the margins long and obliquely rounded, and the edges sharp. Umbones contiguous, small, and obtusely pointed; posterior slopes rounded, subcentral, and overhanging the antero-ventral margins, the surface below them becoming more or less hollowed-out, or almost straight-walled, particularly in casts and exfoliated individuals. Sculpture of numerous concentric rugæ, wide apart at the posterior ends, but in the umbonal regions assuming the appearance of close, concentric, regular plications; no radii visible. Size (maximum), one and a-half inches long by two and a-half inches wide.

Obs.—The degree of curvature in the outline and convexity of the valves in *M. rugocostatus* is very variable. Moore's figure was evidently drawn from a crushed specimen, and were it not for the very characteristic umbonal concentric plications identification would be rendered very uncertain, particularly in a group so variable as the species constituting the genus *Mytilus*. However much the other characters in *M. rugocostatus* may vary, these plications are invariably visible whenever the outer-shelly layers are present. As frequent as not, specimens are met with in the decorticated condition, and then, as Moore observed, "when a portion of the test has adhered to the matrix, leaving an inner layer exposed on the shell, the striæ [plications] are not seen, and the surface appears smooth, giving it the appearance of an entirely different species."

M. rugocostatus is the largest species of *Mytilus* I have seen from our Cretaceous rocks. One other has been described—*M. ingens*, Ten. Woods *—but beyond the original description, nothing appears to be known of it. In the curvature of the shell the present species resembles *M. uralicus*, D'Orb;† and again is not unlike *M. tigrensis*, Blandford,‡ from Abyssinia.

M. Scoulari, Tate, is a synonym, and is so admitted to be by Prof. Tate, and it is possible that an unnamed internal cast figured by Mr. Hudleston may also be identical.

* Proc. Linn. Soc. N.S. Wales, 1882, vii., Pt. 3, p. 389.
† Murchison's Geol. Russia in Europe, 1845, ii., Pt. 3, t. 39, f. 4.
‡ Geol. Zool. Abyssinia, 1870, t. 1, f. 3.

M. rugocostatus has proved a very troublesome fossil in consequence of its variability. In all I have examined about twenty specimens assembled from different sources. In Moore's figure the true outline is to some extent lost, particularly posteriorly, and in the ventral curvature. In the series of figures given on Pl. iii. it will be seen that the ventral margin becomes straighter and straighter, so that the two extremes alone might well be accepted as separate species, were it not for the intermediate forms.

Loc.—Davenport, or Humphrey Springs, Lake Eyre South (*Scoular*);* Lake Eyre Basin (*Tate*);† Mount Hamilton, twenty miles south-west of Lake Eyre South (*Brown*);‡ Beresford Springs, Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate; Mining and Geological Museum, Sydney; Brown.

Genus Modiola, *Lamarck*, 1799.

(Prodrome-Mèm. Soc. Hist. Nat. Paris, 1799, p. 87.)

Modiola Tatei, *sp. nov.*

(Pl. ii., fig. 10-11.)

Sp. Char.—Shell (semi-cast) transversely-elongate, generally filbert-shaped or somewhat lithodomoid in outline, greatest convexity at about the middle of the valves, thence rapidly decreasing towards the posterior. Cardinal margins as nearly as possible half the width of the shell; escutcheon less than half the length of the cardinal margins, and comparatively broad. Ventral margins very gently curved, without sinuation. Anterior ends small, and projecting slightly beyond the umbones. Posterior ends narrow and obtusely pointed; umbones subterminal; posterior slopes obtusely rounded. Adductor impressions large relatively, broad oval, immediately under asth droel margins of the valves.

Obs.—This form possesses an elongate, filbert or lithodomoid appearance. It is much exfoliated, and the sculpture not preserved. Prof. Tate suggested that it might be Moore's *Modiola unica*,§ and although I am not prepared to say that it is not, still, on the only fragment of external shell remaining there is no trace of radii, a distinct feature on his species Moore says. Furthermore, the latter states that *M. unica* is "thickest at the umbones," which the present shell certainly is not. Without an appeal to Moore's type I am not prepared to accept the two shells as identical. I am inclined, from its graceful proportions, to regard it as distinct from any of the other South Australian species.

Loc.—Stuart's (formerly Cooper's) Creek, Central South Australia (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

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* Tate, Trans. R. Soc. S. Austr. for 1985-86 (1887), ix., p. 53.

† Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

‡ Mining and Geological Museum, Sydney.

§ Quart. Journ. Geol. Soc., 1870, xxvi., p. 253, t. 13, f. 5.

Modiola eyrensis, *sp. nov.*

(Pl. ii., figs. 5-9.)

Sp. Char.—Shell (cast) subelongate, and tumid either along median lines from the umbones to the posterior margins or lines nearer the cardinal margins; dilated posteriorly in a transverse direction. Cardinal margins straight, extending for about two-thirds the breadth of the valves; escutcheon short, apparently wide. Ventral margins straight or slightly sinuate towards the anterior ends. Anterior margins rounded; byssal sinus not apparent. Posterior margins boldly rounded, forming wide curves, blunt, not chamfered off. Umbones distant, obtuse; diagonal ridges rounded and broad. Adductor impressions oval, quite posterior and near the dorsal margins; intermarginal areas strongly marked.

Obs.—Although only an internal cast, I cannot divest myself of the conviction that it is distinct from all the other mytiloid shells occurring in our Cretaceous rocks. The high, thrown-back diagonal ridges, straight ventral margins, and dilated posterior ends render it conspicuous.

Loc.—Stewart's (formerly Cooper's) Creek, Central South Australia (*Tate*); Beresford Springs, Lake Eyre South (*Brown*); Primrose Springs, east of the Peake, Central South Australia (*Brown.*)

Hor.—Lower Cretaceous.

Colln.—Tate; Brown.

Modiola subsolenoides, *Hudleston.*

Modiola subsolenoides, Hudleston, Geol. Mag., 1890, vii. (3), p. 245, t. 9, f. 8.

Obs.—I have not met with this species. It is recorded by Mr. W. H. Hudleston.

Loc.—"Neighbourhood of Lake Eyre" (*Hudleston*).

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London.

Modiola ensiformis, *sp. nov.*

(Pl. iii., figs. 8-12.)

Sp. Char.—Shell very elongately-cuneate; greatest convexity at about the middle of the valves, whence the surfaces right and left slope off at a like inclination. Cardinal and ventral margins diverging from one another, both straight, and without sign of curvature or insinuation. Anterior ends small, lobe-like, projecting, their margins rounded; byssal sinus not apparent. Posterior ends laterally compressed, the margins knife-edged, and obliquely rounded above, the posterior-ventral junction almost angular; diagonal ridges more or less acute, distinctly traceable from the umbones to the posterior-ventral angles, and roughly dividing the surfaces of the valves into two acute-angled triangles. Umbones small, rounded, depressed. Surface bearing laminæ of growth coincident with the outline of the posterior

margins on the upper half of each valve, and rectilinear on the lower, the latter being the stronger, forming sharp angles on the diagonal ridges.

Obs.—This neat and pretty shell acquires a distinctive feature from the divergent cardinal and ventral margins. With one exception, *M. ensiformis* does not exceed two and a-half inches long, but the exception referred to in Mr. Brown's collection, although imperfect, is much larger. It represents the posterior two-thirds of valves in apposition, and is two and three-quarter inches long by one and a-half inches wide, and may possibly represent the full-grown condition of the species.

I have not met with *M. ensiformis* in deposits of a smiliar age either in New South Wales or Queensland. It bears some resemblance to *M. siliqua*, Matheron,* from the Lower Quader Sandstone.

The specimen from Mount Margaret, in Prof. Tate's collection, may possibly be a variety, as it exhibits some slight points of difference from the species in chief.

Loc.—Davenport Springs, Lake Eyre South (*Tate*); Springs along the south shore of Lake Eyre South (*Brown*); Mount Margaret, west of Lake Eyre North (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate and Brown.

GENUS NUCULA, *Lamarck*, 1799.

(Prodrome—Mèm. Soc. Hist. Nat. Paris, 1799, p. 87.)

Nucula quadrata, *Etheridge.*

(Pl. iii., figs. 13 and 14.)

Nucula quadrata, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 341, t. 19, f. 5, t. 20, f. 3.

Nucula quadrata, Tate, Proc. Aust. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Nucula quadrata, Eth. fil., Geol. Pal Q'land, &c., pp. 469, 565, t. 26, f. 8 and 9.

Sp. Char.—Shell oblong-quadrate, large, robust, tumid, particularly in the umbonal region, test thick, highly nacreous within, margins smooth. Cardinal margins somewhat arched posteriorly, the curvature more especially noticeable in casts, and nearly vertical anteriorly; escutcheon small and narrow; anterior teeth few, large and robust; cardinal teeth (immediately under the umbones), close, long, and narrow; posterior teeth eight to ten, large and robust. Ventral margins regularly rounded. Anterior ends small, short, the margins rounded. Posterior ends large, their degrees of convexity gradually decreasing to the margins, which are rounded. Umbones prominent, contiguous, tumid, and anteriorly incurved; anterior slopes sowewhat flattened, and sharply separated from the lunule by curved ridges, particularly in casts; posterior slopes rounded; lunule wide, depressed, but its immediate surface flattened. Adductor scars deep, the anterior oval and situated low down, immediately at the termination of the anterior slopes, bounded on their posterior sides by

* *Mytilus*, Geinitz, Quadersandsteingebirge, 1849-50, p. 168, t. 10, f. 14.

ridges, the posterior scars transversely oval, or subtriangular, placed high up, immediately under the cardinal margins, bounded by anterior-ventral ridges; a curved line of small scars extends from each posterior adductor towards the umbones, and within these lines other small retractor (?) scars are sometimes scattered; pallial lines well marked; intermarginal areas wide. Sculpture of delicate concentric lines.

Obs.—This description is drawn up from a series of specimens in the collections of the Geological Survey of N.S. Wales, Prof. Tate, and Mr. Brown, in different states of preservation, some testiferous, others partially so, and one or two in the condition of casts. From its robust appearance and oblong-quadrate outline, in whichever of these conditions specimens may be in, *N. quadrata* can hardly be mistaken for any other species, except *N. gigantea.*

The question of how far *N. quadrata* and *N. gigantea*, Etheridge,* differ from one another is very difficult of solution. In some notes forwarded with his collection, Prof Tate treats them as synonymous, but looking at the type figures they appear distinct; this apparent dissimilarity, however, may arise merely from the state of preservation. Both *N. quadrata* and *N. gigantea* were originally described from the Maryborough beds, in which many of the fossils are much distorted, and often crushed. In the collection of Mr. G. Sweet, of Melbourne, are examples of *Nucula* from this locality that may be either the one species or the other, and with the typical adductor and other muscle scars of *N. quadrata* quite imperceptible. Under these circumstances the identity of the two forms cannot be accepted as conclusively proved, although it will not surprise me to ultimately find that Prof. Tate's view is the correct one.

The Maryborough casts usually display the characters of the hinge from which we learn that in these casts taken collectively there are four narrow, long cardinal teeth on each side the umbones, with between them the posteriorly directed, oblique, and elongately triangular chondrophore, and five or six stout anterior teeth, corresponding to eleven or twelve similar denticles on the posterior hinge. In the South Australian examples it is not possible to arrive at similar exact data, but in all probability the number of teeth was approximately the same.

Loc.—Lake Eyre Basin (*Tate*); Primrose Springs, east of the Peake, Central South Australia (*Brown*).

Hor.—Lower Cretaceous.

Coll.—Tate, and Mining and Geological Museum, Sydney.

Nucula truncata, *Moore.*

(Pl. iii., figs. 17-20; vi., figs. 6 and 7.)

Nucula truncata, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 254, t. 12, f. 9.
Nucula truncata, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.
Nucula truncata, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 469, t. 33, f. 9.

* Quart. Journ. Geol. Soc., 1872, xxviii., p. 341, t. 20, f. 4.

Obs.—Two shells of questionable identity are in Prof. Tate's collection ; they may be *N. truncata*, a Wollumbilla species, but in the absence of the type it seems impossible to arrive at a satisfactory conclusion. Moore says that his *N. truncata* is "readily distinguishable from *N. Cooperi* by its more compressed form and truncated margin," but beyond these features there does not appear to be much difference. One of the specimens, retaining the test, is strongly trigonal in outline, but the true shape is to some extent hidden by the matrix. It possessed a strong posterior slope, and the surface bore fine concentric striations. In the other, which is to all intents and purposes an internal cast, there are six posterior teeth visible, and a very strong anterior adductor scar, but no umbonal scars. The lunule was large, wide and shallow. In both shells the test was thick.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

Nucula Cooperi, *Moore.*

Nucula Cooperi, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 254, t. 12, f. 8.

Nucula Cooperi, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 469, t. 34, f. 11.

Obs.—A third *Nucula*, larger than either of those provisionally referred to *N. truncata* (?) is almost entirely devoid of test. The cast is elongately trigonal, tumid, with incurved beaks, a lunule similar to that of *N. truncata* (?), pronounced adductor scars, particularly the anterior, no umbonal scars, but a thick test, about six narrow cardinal teeth beneath the umbones, a number of posterior teeth, and a strong posterior slope.

This may be *N. Cooperi*, but I do not wish to commit myself to a definite determination. In his notes Prof. Tate suggests that *N. Cooperi* and *N. truncata* are identical, and I am much inclined to regard them so. The brevity of Moore's descriptions has rendered it almost impossible to recognise some of his species, this amongst the number.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Coll.—Tate.

Nucula (?), *sp. ind.*

(Pl. iii., figs. 15 and 16.)

Obs.—Two other specimens forwarded to me by Prof. Tate seem to materially differ from those referred to *N. quadrata* by a less degree of tumidity. The outline resembles that of the latter, but the adductor scars are not definitely present. There are eight posterior teeth, but the cardinal and anterior teeth are but imperfectly visible, and the presence of a chondrophore is by no means certain. The surface is faintly radiately striate.

There is the possibility that these may be small examples of *Nucula gigantea*, Eth., if the latter is really distinct from *N. quadrata*.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS MALLETIA, *Desmoulins*, 1832.

(Act. Soc. Linn. Bordeaux, 1832.)

Malletia elongata, *Etheridge, sp.*

(Pl. iii., figs. 21-24; Pl. vi., fig. 14.)

Leda elongata, Etheridge, Quart. Journ. Geol. Soc, 1872, xxviii, p. 341, t. 20, f. 5.

Adrana elongata, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 566, t. 33, f. 8.

Nuculana (? Yoldia) Randsi, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 566, t. 26, f. 10

Malletia Randsi, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 25.

Obs.—Several examples in different states of preservation are in Prof. Tate's collection, partly testaceous, partly internal casts, or more or less embedded in matrix. I have lately described this species (as *Malletia Randsi)* in detail, and it is sufficient to remark now that in Prof. Tate's specimens the ligament, hinge teeth, deep pallial sinus, and long pallial tongue are shown, with the upward curvature of the posterior portions of the cardinal margins.

The figure of *Leda elongata*, Etheridge, was, it is almost certain, drawn from an imperfect specimen; hence I have for a long time been in a state of indecision as to its relation to *Nuculana Randsi*, mihi. A reconsideration of the subject, however, by the light of a large number of specimens of the latter in different states of preservation has convinced me that the two names must be merged in one, Mr. Etheridge's specific name having precedence.

The presence of a ligament, a large and deep pallial sinus, and the absence of a chondrophore, as exemplified by casts from the Upper Cretaceous of Maryborough, in the cabinet of Mr. George Sweet, seem to indicate a relation with the genus *Malletia*, Desm. (*Solenella*, Sby.), at the same time no trace of the deep linear depressions, said by Fischer to occur in *Malletia*, extending from the umbonal cavities to the anterior adductor scars,* has presented itself. According to Dall,† on the other hand, such depressions do not exist in *Malletia*. Every probability appears to exist that these shells constitute a species of the latter genus.

Loc.—Primrose Springs, east of the Peake, Central South Australia (*Brown*); Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate, and Mining and Geological Museum, Sydney.

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* Man. Conchyl., Fas. 10, 1886, p. 987.

GENUS IDONEARCA, *Conrad*, 1862.

(Proc. Acad. Nat. Sci. Philadelphia, 1862, xiv., p. 289.)

Idonearca (?) robusta, *Etheridge*, sp.

(Pl. iv., figs. 1-3.)

Cucullæa robusta, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 340, t. 20, f. 1.

Cucullæa costata, Etheridge, *ibid*, p. 340, t. 20, f. 2.

Cucullæa robusta, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 565, t. 26, f. 1 and 4.

Obs.—A large and very tumid internal cast is referred with little hesitation to this species. The actual umbones are deficient, but the cast in the umbonal region is much swollen, the sides decreasing, or flattening very rapidly towards the ventral margins, and are traversed by indistinct radiating costæ. The area was concave and very wide, and along the straight cardinal margins are the partial impressions of vertical cardinal teeth, and at the extreme posterior ends, similar impressions of three lateral horizontal teeth. The anterior adductor impressions are obtusely triangular, and the posterior almost square, quite flush with the surface of the cast, and without the slightest trace of impressions, either of shelly supports or circumscribing ridges. The pallial lines are strongly marked, the inter-marginal sufaces convex on the posterior ends, and rather concave on the anterior.

The dental characters are so far destroyed that it is difficult to assign this fossil to its proper generic position. The lateral horizontal teeth are represented on the posterior end of Mr. Etheridge's figure of *C. robusta*, but there are four instead of three. These teeth were denticulated.* A specimen from Maryborough, in the collection of Mr. G. Sweet, Melbourne, also displays similar teeth on the anterior side. Lacking other evidence to the contrary, it seems to me that these specimens, one and all, belong to the same species.

The absence of the raised supports for the posterior adductor scars, and the presence of the cross striation of the lateral teeth removes *C. robusta* from the genus *Cucullæa* proper. The existence of the cross striated lateral teeth allies it to *Idonearca*, Conrad, but it again differs from the latter in the absence of the muscular supports. In *Latiarca*, Conrad, similar lateral teeth are present, and the posterior adductor scars have "their lower margins somewhat raised and acute, but not forming a projecting lamina."† In the present state of our knowledge of its structure, *C. robusta* does not appear to be definitely referable to either of these Cretaceous genera, but to be a form possibly uniting several of the genera of Mesozoic Arcidæ. It possesses the oblique and sub-trigonal form, wide area, and concentric-radiate structure of *Trigonoarca*, Conrad, probably teeth like those of *Idonearca* and *Latiarca*, and the flush undivided-off adductor scars of *Grammatodon*, Meek and Hayden. I refer it provisionally to *Idonearca*.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

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* Geol. Pal. Q'land, &c., 1892, p. 565.

† Meek, Mon. U.S. Geol. Survey (Hayden's), 1876, ix., p. 84.

GENUS TRIGONIA, *Brugnière*, 1789.

(Encycl. Méthod., 1789, i., t. 14.)

Trigonia lineata, *Moore.*

(Pl. iii., figs. 25 and 26.)

Myophoria, sp., McCoy, Trans. R. Soc. Vict, 1865, vi., p. 44.

Trigonia lineata, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 255, t. 13, f. 12.

Trigonia lineata, Lycett, Mon. Brit. Foss. Trigoniæ, No 5, 1879, p. 224.

Trigonia lineata, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Trigonia lineata, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 470.

Sp. Char.—Shell (exfoliated) irregularly deltoid, nearly as broad as long, tumid. Cardinal margins sharply angular; ventral margins gently rounded. Posterior ends but little produced, the margins obliquely rounded, and hardly truncate; diagonal ridges rounded; posterior slopes more or less flattened. Two short depressions, or grooves, indent the posterior margins internally representing ribs (in the complete valves), probably connected with the incurrent and excurrent orifices. Margins of the valves smooth. Posterior adductor impressions broad oval, confined to the posterior slopes. Pallial lines well within the ventral margins, leaving broad and slightly concave intermarginal areas.

Obs.—The specimen is both imperfect and much exfoliated, becoming in places almost an internal cast. The anterior ends and umbones are incomplete, and the teeth are not visible in consequence of adherent testaceous matter. Moore remarked that the umbones are turned towards the anterior, which is unusual in this genus.

Loc.—Lake Eyre Basin *(Tate)*.

Hor.—Lower Cretaceous.

Colln.—Tate.

Trigonia cinctuta,* *sp. nov.*

(Pl. iv., fis. 4-6, ? 7.)

Trigonia, sp. ind., Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 567, t. 26, f. 5.

Sp. Char.—Shell (left valve) nasiform, deltoid-scaphoid, inclined to prow shaped, produced posteriorly. Valves convex, but not tumid, and traversed by gradually widening and very marked cinctures; margins plain; interior highly nacreous. Cardinal margins strongly arched, the respective limbs very disproportionate in length. Ventral margins rounded, emarginate towards the posterior-ventral, or anal angles, which are rounded. Anterior ends short, the margins obliquely rounded above, regularly convex below. Posterior ends more or less nasute, the margins somewhat obliquely truncate. Umbones not greatly elevated, medianally directed, neither bending to the anterior nor posterior. Area concave, moderately wide only, and bounded by ill-defined curved ridges, which do not attain to the posterior dorsal angles; escutcheon proper narrow and groove-like, its two halves separated by the erect posterior dorsal edges. Diagonal ridges curved,

* *Cinctutus*—a girding.

reaching to the posterior-ventral or anal angles, acute from the umbones for about half their lengths, then becoming more obtuse onwards, and forming the posterior borders of the cinctures; posterior slopes obliquely flattened, and subdivided by three fine ridges parallel to the diagonal ridges. Central cardinal process strong, projecting, and markedly V-shaped; anterior socket with about twelve anterior and fourteen transverse denticles, the whole supported on a strong dental buttress; posterior socket with about fourteen anterior and twelve to fourteen similar posterior denticles Anterior adductor scars deep, capuliform, with an oblique median division; posterior scars shallow, almost square, medianally divided by a faint transverse ridge; pallial lines rather square at their posterior extremities; intermarginal areas wide. Sculpture anterior to the cinctures consisting of oblique, parallel, undulating, and V-scripted costæ, the V-scripts almost median in position, and each costa terminating at the cinctures in a node; costæ crossed by fine concentric laminæ, which also traverse the cinctures, and, forming at the diagonal ridges right-angles, pass across the posterior slopes, and are then deflected along the area parallel to the dorsal margins.

Obs.—This shell is quite distinct from *Trigonia nasuta*, Etheridge,* and may be distinguished at once by the sculpture, which in the latter is simply concentric.

The presence of cinctures on the valves of Trigoniæ does not appear to be by any means a common feature. Amongst those species possessing cinctures may be mentioned *T. gibbosa*, Sby.,† *T. damoniana*, DeLoriol,‡ both from the Portland Oolite, and *T. interlævigata*, Quenst.§

A cup-like depression exists on the hinge plate immediately above the anterior angle of the posterior adductor impression, and at the after end of the posterior cardinal socket of the left valve, that has the appearance of a supplementary muscle scar. Although often figured, for instance by Lycett, it is seldom alluded to in descriptions. Agassiz speaks of it as a "supplementary muscle,"** and R. P. Whitfield describes its presence in *T. Mortoni*, from the Greensand Marls of New Jersey, as the pedal scar.¶

D'Orbigny speaks of muscular scars within the umbonal cavities of *Trigonidæ*,‖ but I have not succeeded in distinguishing any in the present species

The faint transverse ridges on the posterior adductor scars, and the oblique median divisions of the anterior scars, are continuous with the impressions of the pallial lines, a similar feature being shown on the internal cast of *T. paradoxa*, Ag.††

In Prof. Tate's collection is the internal cast of a *Trigonia*, in a poor state of preservation, and labelled *T. nasuta*, Etheridge. I am, however, inclined to regard it as that of the present species.

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* Quart. Journ. Geol. Soc., 1872, xxviii., p. 339, t. 19, f. 2, 2*a*.
† Min. Con., 1819, iii., t. 235-36.
‡ Lycett, Mon. Brit. Foss. Trigoniæ, No. 2, 1874, p. 88, t. 21, f. 2-5.
§ Der Jura, 1858, t. 67, f. 8.
** Etude Crit. Moll. Foss. (Trigonies), 1840, p. 6.
¶ Mon. U.S. Geol. Survey (Powell's), 1885, ix., p. 112.
‖ Fal. Franç. Terr. Cret. (Lamellibranches), 1844, iii., Livr. 79-90, p. 128.
†† Etude Crit. Moll. Foss. (Trigonies), 1840, t. 10, f. 8 and 12.

Loc.—The specimens were sent to Mr. Brown by Mr. — Kemp, manager of the Peake Station, between Lake Eyre and the Transcontienental Railway, and are doubtless from that area.

Hor.—Lower Cretaceous.

Colln.—Brown.

GENUS CORBICULA, *Mühlfeldt*, 1811.

(Berliner Mag., 1811, v., p. 56.)

Corbicula (?) Meeki, *Eth. fil.*

(Pl. vi., figs. 8-13.)

Unicardium Meeki, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 472, t. 27, f. 2 and 3 (*Mactra* on plate explanation).

Undetermined Genus (? Unicardium), Eth. fil., *loc. cit.*, t. 26, f. 13-15.

Sp. Char.—Shell obtusely triangular, somewhat cuneiform, and posteriorly produced, moderately convex. Cardinal margins considerably arched, the anterior shorter than the posterior; ventral margins rounded throughout, curving rapidly upwards anteriorly, but less curved posteriorly; anterior margins well rounded; the posterior-ventral extremities produced, but obtusely rounded. Umbones moderately large, obtuse, and contiguous; anterior and posterior diagonal slopes obtusely rounded; posterior area ill defined; ligament short and strong. A large, robust, projecting, triangular, sub-median cardinal tooth in each valve; anterior and posterior lateral teeth lamellar and projecting; sculpture of concentric lamellæ, of slightly variable width, and on the anterior slopes gathered in bundles; the lamellæ bear numerous very fine and regular concentric lines. Size of adult shell—$1\frac{3}{4}$ inches wide, $1\frac{1}{2}$ inches long, and $1\frac{1}{8}$ inches through the united valves.

Obs.—In 1892, when studying the Queensland Cretaceous Mollusca, this shell appeared to me to be related to *Mactra*, and it was so called in the plate explanation (Pl. 27, f. 2 and 3), but in the body of the work referred to *Unicardium*, although at the time I felt both determinations to be very dubious ones. I have now, through the kindness of Mr. W. H. Rands, made a re-examination of the type specimens, and these, in conjunction with some additional material in Prof. Tate's collection, lead to the conviction that these shells are much more nearly related to *Corbicula* or *Cyrena* than to any other genus. The absence of a chondrophore for the reception of a resilium, and the all-but absolute simplicity of the pallial lines, renders a reference to *Mactra* and its allies inadmissible.

The reference to *Unicardium* was made in consequence of a suggestion of Prof. Tate's, but it now becomes evident that this was a mutual error.

I am further of opinion that another Queensland shell, figured as an "Undescribed genus (*Unicardium ?*)," * is identical with that named *U. Meeki*, being only a smaller individual.

The hinge structure is not fully known, but the left valve† shows the sub-median

* Geol. Pal. Q'land, &c., 1892, t. 26, f. 13-15. † *Ibid*, f. 14.

cardinal tooth as in *Corbicula*, whilst the positions of the anterior and posterior cardinals are marked by broken surfaces; the lateral teeth are lamellar. An internal cast in Tate's collection helps to elucidate this, although the teeth are not seen in a high state of preservation. Still, the submedian cardinal teeth are visibly interlocking, the right anterior may be bifid, but neither of the posterior cardinals is preserved. Another internal cast displays the adductor impressions and the pallial lines, the latter all but entire The hinge structure is not typically that of *Corbicula*, but it approaches very closely to it; possibly our shells form a specialised group of that genus.

In 1898 Prof. Tate cautiously referred an opalised shell from the White Cliffs Opalfield to Whitfield's genus *Platopis* as *P. (?) corrugata.** The interior of this form is unknown, but I expect it will prove congeneric with the present shells.

The two species *Corbicula (?) Meeki* and *Platopis (?) corrugata* may be distinguished by the greater transverse diameter (through the valves) of the former, in proportion to the other measurements, giving to the united valves a more tumid or inflated appearance; the valves are less attenuated posteriorly than those of *P. (?) corrugata.*

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS CARDIUM, *Linnæus*, 1758.

(Syst. Nat., Ed. x., p. 678.)

Cardium (?) Browni, *sp. nov.*

(Pl. vi., figs. 3-5.)

Sp. Char.—Shell sub-trigonal, nearly equilateral, very tumid. Cardinal margins arched, short. Ventral margins rounded. Anterior and posterior ends nearly equal, the anterior margins rounded, and the posterior subtruncate. Umbones high, well isolated, strongly incurved, pointing slightly towards the anterior. Posterior slopes broad and flattened, bounded by strong diagonal ridges. Anterior adductor scars faintly marked, the posterior oval and confined to the posterior slopes. Pallial sinuses wide and shallow. Sculpture concentric and fine.

Obs.—I have not succeeded in isolating the dental features of this shell. It may be a *Cardium*, but there is no trace of the posterior radiating costæ of *Protocardium*, although externally it has the aspect of some species of that genus. The principal characters are the very tumid form of the umbonal regions of the valves, and the nearly equilateral proportions of the latter.

I have not seen this species from any Queensland Cretaceous locality.

It is named in honour of Mr. H. Y. L. Brown.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

* Trans. R. Soc. S. Austr., 1898, xxii., Pt. 2, p. 78, fig. p. 79.

GENUS ISOCARDIA, *Lamarck*, 1799.

(Mèm. Soc. Hist. Nat. Paris, 1799, p. 86.)

Isocardia (?) Tatei, *sp. nov.*

(Pl. iii., fig. 27 ; Pl iv., figs. 13 and 14.)

Sp. Char.—Shell rhomboidal, tumid, inflated in the umbonal regions; test thick; valves rapidly decreasing in inflation towards the ventral margins. Cardinal margins arched slightly. Ventral margins rounded. Anterior ends very small, slightly projecting. Posterior ends large, somewhat laterally compressed. Umbones approximate, nearly touching, almost overhanging the anterior ends; lunule very large comparatively, heart-shaped, bordered inside the impressed outline by four large pits or punctæ on each side; area wide and flat, bordered by several pits or punctæ on each side; ligament short, narrow. Diagonal ridges sharp and pronounced in the umbonal regions, but rapidly dying off on the posterior ends. Sculpture of fine concentric lines, but on the internal cast there are indications of indistinct radii.

Obs.—I am, unfortunately, unacquainted with the dental characters of this peculiar shell. *Glossus*(=Isocardia†), Veniella*, and *Venilicardia* all put in a claim so far as external features are concerned, and in another it even resembles *Glossocardia*. The peculiar features of *I.* (?) *Tatei* lie in the characters of the lunule and area. The former is comparatively large, widely heart-shaped, deeply excavate, and margined on each side by four deep punctæ; the area is similarly bounded on each side by punctæ.

The inrolled beaks, large and deeply impressed lunule and ligament, indicate the provisional placing of this shell in the Glossidæ, in the absence of more determinate characters.

It corresponds in outline to some of the shells placed by D'Orbigny in *Isocardia*, and in two species—*I. ataxensis** and *I. carantonensis†* there are indications of openings in the lunules; the latter in particular has apparent openings on each side, closely resembling those seen on *I.* (?) *Tatei.*

Stoliczka throws great doubt on the reference of most of D'Orbigny's species to *Isocardia* (=*Glossus*), but be this as it may, I am unable with the material at my disposal to suggest a more fitting generic reference.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS CYPRINA, *Lamarck*, 1818.

(Hist. Nat. Anim. s. Vertèb., 1818, v., pp. 556 *bis*, and 566.)

Cyprina ? *(vel* **Cytherea ?) Clarkei**, *Moore.*

(Pl. v., figs. 5, 5*a*, 6 ; Pl. vi., figs. 1 and 2).

Cytherea Clarkei, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 250, t. 13, f. 1.

Cyprina expansa, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 338, t. 19, f. 1.

* Pal. Franç. Terr Cret. (Lamellibranches), 1844, iii., Livr. 77-90, t. 251, f. 5. † *Ibid*, t. 252, f. 3.

Cytherea Clarkei, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Cyprina Clarkei, Eth. fil., Geol. Pal. Q'land, &c., 1892, pp. 474 and 568, t. 26, f. 18 and 19; t. 27, f. 9-11.

Obs.—Both Prof. Tate and Mr. Brown have obtained specimens of this species from the Lake Eyre Basin. It is most unfortunate that all examples hitherto collected have been in so poor a state of preservation that its generic identity still remains an open question. Prof. Tate's specimen is the best preserved, the right valve retaining portions of the test intact. The wide laminæ of growth mentioned by Moore are ornamented along their lower edges by almost microscopic short and delicate crenulations, giving a minutely fringed appearance to the laminæ. There are strong nymphæ.

In one of his letters to me Prof. Tate remarked—"To what genus does *Cytherea* vel *Cyprina Clarkei* belong? Certainly to neither, but has much affinity in its hinge characters to *Unicardium*, although it seems to have a sort of pallial sinus." On the first point I cordially agree with Prof. Tate, but as to *Unicardium* I do not think any relation exists between that genus and *C.* (?) *Clarkei*. I refrain from any further opinion until certain unfinished studies of N.S. Wales material are completed, when I believe I shall be in a position to indicate a much closer alliance in another direction. I am perfectly aware that under existing conditions the name *Arctica*, Schum., should be substituted for that of *Cyprina*, but under the circumstances I refrain from disturbing existing nomenclature.

The most noticeable peculiarities about this species are the protuberant anterior ends and their compressed nature, with the sculpture already mentioned.

Loc.—Wood-duck Creek, near the Peake, Central South Australia (*J. Canham*);* the Peake, Central South Australia (*J. Chandler*);† Cootanoorina, thirty to forty miles west of the Peake, Central South Australia (*J. Chandler*);‡ Davenport or Humphrey Spring, Lake Eyre South (*G. Scoular*);§ Springs along the south shore of Lake Eyre South (*Brown*); Gregory River, "north of Finnis Springs" (*Moore*).‖

Hor.—Lower Cretaceous.

Colln.—Tate and Brown.

GENUS CYTHEREA, *Lamarck*, 1806.

(Ann. Mus. Hist. Nat. Paris, 1806, vii., p. 132.)

Cytherea (?) sub-aurita, *sp. nov.*

(Pl. v., figs. 11 and 12.)

Sp. Char.—Shell ovately-triangular, or sub-aurate, compressed; test thin. Cardinal margin very much arched, short anteriorly, long posteriorly. Ventral margins convex. Anterior ends small, the margins rounded; posterior ends rather produced, narrowed by the rapidly descending posterior dorsal margins. Umbones contiguous, small, but prominent,

* Tate, Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 104.

† Tate, *Ibid*, p. 179. ‡ Tate, *Ibid*, p. 179. § Tate, *Ibid* for 1885-86 (1887), ix., p. 53.

‖ Quart. Journ. Geol. Soc., 1870, xxvi., p. 251. Gregory Creek is north of Lake Torrens, not Finnis Springs—at any rate the only locality of that name mentioned in J. McDouall Stuart's "Journals" (8vo, 1865), pp. 53 and 87, is so.

forming marked apices to the ovately-triangular outline of the valves; no defined lunule; escutcheon well marked, and entirely occupied by the ligament. Anterior and posterior slopes and diagonal ridges undefined. Anterior and posterior adductor scars faintly marked, shining. Pallial sinuses short but wide, no pallial tongues. Sculpture very find and concentric.

Obs.—The hinge characters of this species are unknown to me. It is an obscure shell, apparently allied to *Cytherea* (?) *woodwardiana*, Hudleston, but distinct from the latter. It is more triangular in outline, possesses a more arched cardinal margin, smaller anterior, and deeper posterior ends. *C.* (?) *subaurita* to some extent resembles *C. plana*, Sby.,* from the Indian Cretaceous, except that the umbones are more median, and the anterior margins much less excavate.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

Cytherea (?) woodwardiana, *Hudleston*

Cytherea Woodwardiana, Hudleston, Geol. Mag., 1884, i. (3), p. 340, t. 11, f. 8*a-c*.

Cytherea Woodwardiana, Eth. fil., Geol. Pal Q'land, &c., 1892, p. 473, t 27, f. 12-14.

Obs.—I have met with only one doubtful example of this species in Mr. Brown's collection.

Loc.—Mount Hamilton, twenty miles south-west of Lake Eyre, or else forty miles south-west of the Peake, Central South Australia (*Brown*); Beresford Springs, south shore of Lake Eyre (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London; and Brown.

Cytherea (?) Moorei, *Eth. fil.*

Cyprina (?) *sp.*, Hudleston, Geol. Mag., 1884, i. (3), p. 341, t. 11, f. 7*a* and *b*.

Cytherea (*Cyprina* ?) *Moorei*, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 474, t. 34, f. 12 and 13.

Obs.—I have not observed this form in either of the collections now before me.

Loc.—Mount Hamilton, twenty miles south-west of Lake Eyre, or else forty miles south-west of the Peake, Central South Australia (*Brown.*)

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London.

GENUS PALÆOMŒRA, *Stoliczka*, 1870.

(Cret. Fauna S. India (Pal. Ind.), 1870, iii., Parts 1-4, p. 116.)

Palæomœra (?) mariæburiensis, *Etheridge*, sp.

Tellina mariæburiensis, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 341, t. 20, f. 6 and 6*a*.

* Stoliczka, Cret. Fauna S. India (Pal. Ind.), 1870, iii., Parts 1-4, p. 169, t. 7, f. 1-4.

Palæomœra mariœburiensis, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 570.

Obs.—A partial internal cast, probably referable to this species, displays more or less shoe-horn shaped adductor scars, a deep and wide pallial sinus, and a quite linear pallial tongue. Small fragments of the test adhere to the cast, exhibiting a fine and close linear sculpture.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Coll'n.—Tate.

GENUS MACROCALLISTA, *Meek*, 1876.

(Invert. Cret. and Tert. Foss. Up. Missouri Country, 1876, p. 179.)

Macrocallista (?) plana, *Moore.*

(Pl. v., figs. 7-10.)

Myacites planus, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 254, t. 12, f. 10.

Macrocallista plana, Eth. fil., Geol. Pal. Q'land, &c., p. 476, t. 27, f. 6-8.

Obs.—A single medium-sized right valve, with portions of the testaceous matter remaining in Prof. Tate's collection, and two entire specimens, partly exfoliated and partly casts, are in Mr. Brown's. The hinge characters are not visible in either specimen, but one of Mr. Brown's examples exhibits the anterior adductor scars high and projecting on their posterior sides, which indicates in the actual shell a rather deeply-excavated scar.

I am not, even now, able to indicate with any degree of accuracy the genus to which this fossil should be referred. I have already pointed out that Moore's *Myacites planus* does not fall within the limits of *Myacites* as restricted by Authors. The latter is a gaper, the present specimens are entirely closed, the apparent gape at the anterior end of one of my former figures* being caused by imperfection of the specimen. The reference to *Macrocallista* must be regarded as purely tentative until examples with the hinge characters exposed are available.

Congeneric, even if not specifically identical with *M. plana*, are the following three shells :—

Tancredia plana, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 254, t. 13, f. 13; *Tancredia* (?) *plana*, Eth. fil., Geol. Pal Q'land, &c., 1892, p. 477. The type was evidently a specimen in very poor condition, and seems to differ only from *M. plana* in a somewhat more pointed posterior end.

Myacites, sp., Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii, p. 348, t. 25, f. 7.

Tancredia, sp., Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 348, t. 25, f. 8.

Tancredia (?), *sp*, Eth fil., Geol. Pal. Q'land, &c., 1892, p. 478.

The two last species (?) were regarded by Mr. Etheridge, who described them, as of Oolitic age, but the locality given—Gordon Downs—is now known to be one within the area of the great Rolling Downs Formation. I believe all three of the above to represent conditions of Moore's *Myacites planus.*

* Geol. Pal. Q'land, &c., 1892, t. 27, f. 6 and 7.

Loc.—Lake Eyre Basin (*Tate*) ; Beresford Springs, Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate and Brown.

GENUS TATELLA, *Eth. fil.*, 1901.

(Bull. Geol. Survey Q'land, 1901, No. 13, p. 27.)

Tatella maranoana, *Eth. fil.*

(Pl. ii., figs. 25 and 26 ; Pl. iii., figs. 28 and 29.)

Corbicella (?) *maranoana*, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 471, t. 27, f. 4, t. 28, f. 2 and 3.

Tatella maranoana, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 28, t. 1, f. 5, t. 2, f. 8.

Obs.—I have no further remarks to make on this shell, except to point out that it may *perhaps* bear some relation to the Genus *Meekia*, Gabb,* particularly *Meekia navis*, Gabb.†

Loc.—The Peake, Central South Australia (*Tate*), and Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS CORIMYA, *L. Agassiz*, 1842.

(Étude Crit. Moll. Foss., 1842, 3e Livr., p. 262.)

Corimya (?) primula, *Hudleston*, sp.

Thracia primula, Hudleston, Geol. Mag., 1890, vii. (3), p. 245, t. 9., f. 7.

Corimya primula, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 481, t. 28, f. 11.

Obs.—This form is probably distinct from *C. Wilsoni*, Moore, sp. I have not seen a South Australian specimen.

Loc.—Primrose Springs, near the Peake, Central South Australia (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Natural History Museum, London.

GENUS PHOLADOMYA, *G. B. Sowerby*, 1823.

(Genera of Shells, 1823, No. 19.)

Pholadomya ebaensis, *sp. nov.*

(Pl. v., figs. 3 and 4.)

Sp. Char.—Shell (cast) cuneiform, very inequilateral, very tumid anteriorly, much compressed posteriorly, gaping only at the posterior end. Cardinal margin not extending the entire width of the shell, short and arched anteriorly, straight posteriorly. Ventral margins sigmoidal, insinuated immediately below the umbones. Anterior ends tumid, divided into two surfaces, a lateral and a terminal ; the former is defined in each valve by two strong costæ radiating from the umbones, within which the surface is concave, producing

* Report Geol. Survey California, Pal., 1864, i., Sect. 4, p. 191.

† *Ibid*, p. 192, t. 25, f. 180.

a cincture. The latter surface is bounded by the foremost of the costæ and the anterior margins, within which the surface is flattened above and somewhat concave below, producing in the united valves a sub-cordate and more or less truncated end, the immediate anterior end being closed, and the united margins convex in outline and projecting. Posterior ends short, rapidly compressed laterally, with somewhat obliquely truncated margins, which gape, the opening extending forwards dorsally for about half the length of the posterior cardinal margins. Umbones incurved to the anterior; lunule small, heart-shaped; umbonal region generally broad and tumid, high; anterior costæ extending to the umbonal apices, but in their course over the umbones describing a posterior curve; anterior slopes sharply falling away, posterior slopes gently convex. Posterior adductor impressions deltoid, and concentrically marked. Sculpture of rather rugged concentric laminæ, very oblique on the truncated portions of the anterior ends, transverse in the cincture, thence concentric onwards, crossed in the cincture only by faint and fine radiating costæ, producing a cancellation.

Obs.—The pallial and anterior adductor impressions are not visible on this cast. Notwithstanding that the specimen is in poor condition, I think I may say that the shell was devoid of a circumscribed or false cardinal area, and it will therefore fall into the first of Agassiz's two great divisions of the *Pholadomyæ*—"Pholadomyes sans aire cardinale circonscrite." Within this section it finds its place in the section "Pholadomyæ bucardinæ," and by its form is allied to such Upper Oolite species as *P. crassa*, Ag.,* *P. truncata*, Ag.,† *P. bicostata*, Ag.,‡ and *P. Michelini*, Ag.‖ The presence of the two strong costæ and the contained cincture is seen in the second and third species, and the high umbonal region in the first and last. Although *P. ebaensis* agrees so far with these, there is no actual alliance, as it differs from all of them in the highly cordate and circumscribed anterior end, strong umbonal keels, and the great prominence generally of the umbonal regions. In the former of these characters *P. ebaensis* resembles the Callovian *P. carinata*, Goldf.

Amongst Cretaceous *Pholadomyæ* I find two at least—*P. Malbosi*, Pictet,§ from the Neocomian strata of the Basses Alpes, &c., and *P. genevensis*, Pictet and Roux,¶ from the Swiss Gault—possessing the high umbonal development and peculiar anterior end of our form. Both species, however, belong to the section "cardisioides" of Agassiz's second great division—"Pholadomyæ avec une aire cardinale circonscrite"—but at the same time one of the characters of the shells of this section is the flattened anterior end.

No relation whatever exists between *P. ebaensis* and the Gordon Downs cast** referred to *Pholadomya* by Mr. R. Etheridge.

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* Étude Crit. Moll. Foss. Mon. Myes, 1842, p. 81, t. 6*d*, f. 1-3.
† *Ibid*, p. 91, t. 7*d*, f. 4-10, t. 8, f. 5-7.
‡ *Ibid*, p. 94, t. 4*b*, f. 3-6.
‖ *Ibid*, p. 100, t. 6*d*, f. 4-6.
§ Mélanges Pal., 1867, i., Livr. 2, p. 92, t. 19, f. 3*a-c*; Moesch, Mon. Pholadomyen, 1875, p. 88, t. 30, f. 5, t. 35, f. 1*a-c*.
¶ Moesch, *loc. cit.*, p. 97, t. 32, f. 2-4.
** Quart. Journ. Geol. Soc., 1872, xxviii., p. 347, t. 25, f. 6.

Loc.—Near Mount Paisley, Mount Eba District, about ninety miles south-west of Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Brown.

GENUS GLYCIMERIS (*Klein*), *Lamarck*, 1799.

(Mèm. Soc. Hist. Nat. Paris, 1799, p. 83.)

Glycimeris rugosa, *Moore, sp.*

(Pl. iv., figs. 8, 9, and ? 12.)

Panopæa rugosa, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 253, t. 13, f. 7.

Panopæa sulcata, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p 342, t. 21, f. 2*a* (*non* f. 2).

Myacites (?) *australis*, Hudleston, Geol. Mag., 1884, i. (3), p. 340, t. 11, f. 9.

Myacites rugosa, Tate, Proc. Austr. Assoc. Adv. Sci for 1888 (1889), i., p. 230.

Glycimeris rugosa, Eth. fil., Geol. Pal. Q'land, &c., 1892, pp. 478 and 571 (*pars*), t. 28, f. 4 and 5 (? f. 6).

Glycimeris rugosa, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 29, t. 4, f. 1.

Obs.—I have no further facts to record regarding this species.

Loc.—Lake Eyre Basin (*Tate*); Springs along the south shore of Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate and Brown.

Glycimeris Maccoyi, *Moore*, sp.

(Pl. iv., figs. 10 and 11.)

Mya Maccoyi, Moore, Quart. Journ. Geol. Soc., 1870, xxvi, p. 253, t. 13, f. 8.

Panopæa sulcata (pars), Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 342, t. 21, f. 2 (*non* f. 2*a*).

Myacites M'coyi, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Glycimeris (?) *Maccoyi*, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 480.

Glycimeris (?) *Maccoyi*, Eth. fil., Bull. Geol. Survey Q'land, 1901, No. 13, p. 30.*

Glycimeris sulcata (pars), Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 571 (*non* t. 27, f. 18).

Obs.—A specimen, partly a cast and partly testaceous, occurs amongst Prof. Tate's fossils, and an imperfect cast amongst Mr. Brown's.

Glycimeris Maccoyi is distinguished from *G. rugosa* by its greater width in relation to its length, and there is a more wedge-like form; the anterior ends are proportionately longer and the cardinal margins straighter.

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* Two errors occur in the synonomy here given. In the first line *Panopæa Maccoyi* should read *Mya Maccoyi*, and in the sixth line t. 17, f. 18, should read t. 27, f. 18.

Loc.—Lake Eyre Basin (*Tate*); Springs along the south shore of Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Collns.—Tate and Brown.

Glycimeris eyrensis, *sp. nov.*

(Pl. v., figs. 1 and 2.)

Sp. Char.—Shell (cast) large, tumid, nearly equilateral, almost quadrangular, gaping at both extremities. Cardinal margins oblique anteriorly, nearly straight posteriorly, and internally much thickened along the latter; ventral margins nearly straight medianally, gently curved at both ends. Anterior ends tumid, the margins rounded, and the gape wide. Posterior ends tumid, margins oblique above, rounded below, and the gape wide. Umbones tumid and depressed, the centres of the valves very tumid, but below these points the flanks are flattened; anterior diagonal ridges rounded, the slopes flattened; posterior diagonal ridges sharper and more conspicuous than the anterior, the slopes rounded. Pallial sinuses very wide and deep; pallial tongues long and narrow. Sculpture evidently consisted of band-like and regular laminæ of growth, very perceptible on the cast. Length two and a quarter inches; width three and a half inches; and thickness one and a half inches.

Obs.—This is a much heavier, more tumid, and thicker shell than *Glycimeris rugosa*, the relative proportions of the two species being quite different. It is narrower in proportion to its length than *G. rugosa*, the anterior ends are shorter, the entire umbonal regions more globose or swollen, the resulting thickness of the shell when the valves are in apposition being much greater. In *G. rugosa* the anterior gape is not apparent, here it is very marked. These points are, of course, only questions of degree, but when taken together they afford a ready means of distinguishing the two shells.

Loc.—Beresford Springs, Lake Eyre South (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Brown.

SCAPHOPODA.

Genus Dentalium, *Linnæus*, 1740.

(Syst. Nat., Edit. ii., 1740, p. 64.)

Dentalium wollumbillænsis, *Eth. fil.*

(Pl. vi., fig. 31.)

Dentalium lineatum, Moore (*non* Guéranger), Quart. Journ. Geol. Soc., 1870, xxvi., p. 256.

Dentalium arcotinum, Tate (*non* Forbes), Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Dentalium wollumbillænsis, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 483.

Obs.—Smooth and shining fragments of this Scaphopod are common in some of the drab or dark limestones of the Lake Eyre Basin. The shell was very thin, very feebly if

at all curved, and with an average diameter of one and a-half millimetres. The sculpture consisted of the most microscopic concentric threads.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GASTEROPODA.

GENUS CINULIA, *Gray*, 1840.

(Synop. Contents Brit. Mus., 1840.)

Cinulia Hochstetteri, *Moore*, sp.

(Pl. vi., fig. 25.)

Actæon Hochstetteri, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 256, t. 10, f. 19.

Cinulia Hochstetteri, Tate, Proc. Aust. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Cinulia Hochstetteri, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 484.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

Cinulia (?) depressa, *Moore*, sp.

Actæon depressus, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 256, t. 10, f. 20.

Actæon or *Avellana, sp.*, Hudleston, Geol. Mag., 1890, vii. (3), p. 243, t. 9, f. 4.

Actæon depressus, Eth. fil., Geol. Pal. Q'land, 1892, p. 484, t. 29, f. 9.

Obs.—Hudleston states that an unspecified *Actæon* or *Avellana* figured by him possesses a single fold on the columella, but no mention is made of the condition of the outer lip; possibly it was imperfect. So far, therefore, this species may be referable either to *Cinulia* or *Actæon*.

Loc.—Primrose Springs, near the Peake, Central South Australia (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Natural History, Museum, London.

GENUS DITREMARIA, *D'Orbigny*, 1843.

(Pal. Franç. Terr. Cret. (Gasterop.), 1843, ii., Livr. 49-60, p. 276.)*

Ditremaria (?) cretacea, *sp. nov.*

(Pl. vi, figs. 23 and 24.)

Obs.—I venture to refer a very interesting and partial internal cast, with portions of the inner pearly testaceous layer adhering, to this genus. The form is conical and trochoid, with six partially preserved, gradually enlarging, step-like, and more or less concave-sided whorls, with the most anterior (probably the body-whorl) larger than either of the others; the sutural angle is sharp and prominent. The anterior surface, or base, and the mouth are not preserved. The surface of the specimen bears traces of spiral sculpture, with very con-

* See also Pal. Franç. Terr. Jurass., 1852-3, ii. (Gasterop.), Livr. 87-89, p. 378.

cave transverse lines of growth, which on the posterior whorls are much stronger and costa-like.

I have placed a note of interrogation after the generic name for two reasons. In the first place, the absence of the immediate base leaves the presence or absence of an umbilicus in doubt; and in the second, the possession of a band is not conclusively proved, although I believe one to have existed—certainly the respiratory orifice is not visible. The general resemblance to D'Orbigny's figures of *Ditremaria* is, however, so strong, particularly to *D. bicarinata*,* that notwithstanding these discrepancies, I think the determination will be maintained. Should such be the case, it will prove very interesting to find so typical a Lias and Oolite genus present in our Lower Cretaceous rocks.

A general resemblance exists to some extent between this fragment and the apical portion of a *Rapa* or *Tudicla*,† but our fossil is bilaterally symmetrical, and destitute of the excentric apex of either of the above; nor is there any evidence of the characteristic mouth of the latter. Again, it is not unlike the apical portion of a tuberculate *Perissolax*, Gabb.‡

Loc.—Dulkaninia Bore, at a depth of 1,400 feet (*Brown*).

Hor.—Lower Cretaceous.

Coll'n.—Brown.

GENUS DELPHINULA, *Lamarck*, 1804.

(Ann. Mus. Hist. Nat. Paris, iv., p. 108.)

Delphinula (?) Sturti, *sp. nov.*

(Pl. vi., figs. 21 and 22.)

Sp. Char.—Entire shell unknown. Body-whorl obtusely sub-angular, bearing five equidistant spiral keels, the odd or middle one being the most prominent, and giving to the otherwise rounded whorl the slightest degree of angularity; interspaces rather concave and filled with delicate spiral lines, the whole crossed by flattened laminæ of growth, becoming somewhat rougher towards the outer lip; no coronation. Above the posterior keel the surface of the whorl slopes inwards towards the suture.

Obs.—Although only a fragment, the characters are sufficiently clear to warrant the application of a specific name. Moore says of his *Delphinula reflecta*,§ from the Queensland Cretaceous, that the test was not in a good state of preservation; still, unless an absolutely internal cast, it could hardly have failed to display traces of the above conspicuous sculpture.

Delphinula (?) *Sturti* is not closely related to the Indian *D. annularis*, Stol., but in contour approaches nearer to the so-called *Gyrodes excavata*, Mich. sp., as figured by Whiteaves.

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* Pal. Franç. Terr. Jurass, 1852-3, ii. (Gasterop.), Livr. 87-89, p. 380, t. 340, f. 8-11.

† See Stoliczka, Cretaceous Fauna S. India (Pal. Ind.), 1867, ii., Pts. 1-4, t. 12, f. 7, 8, and 9a.

‡ Report Geol. Survey California, Pal., 1864, i., Sect. 4, t. 21, f. 110.

§ Quart. Journ. Geol. Soc., 1870, xxvi., p. 256, t. 10, f. 21.

¶ Mesozoic Foss. Canada, 1879, i., Pt. 2, p. 124, t. 16, f. 2, 2a.

Named in honour of Captain Charles Sturt, one of Australia's most intrepid explorers.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS VANIKOROPSIS, *Meek*, 1876.

(Report U.S. Geol. Survey Territories (Hayden's), 1876, ix., p. 351.)

Vanikoropsis (?) Stuarti, *sp. nov.*

(Pl. vi., figs. 18-20.)

Sp. Char.—Shell naticiform more or less, sub-globose; spire slightly elevated; whorls four (at least), globose, slightly channeled along the sutures; test thick. Inner lip reflected. Sculpture consisting of wavy spiral equidistant lines, alternately larger and smaller, crossed by distant slightly curved ribs, most prominent on the posterior halves of the whorls, the longitudinal valleys between being filled with almost microscopic lines of growth.

Obs.—An umbilicus does not appear to have existed. This, with the form and nature of the sculpture, tends to place the shell very near to Meek's *Vanikoropsis*, an American Cretaceous genus.

Named in honour of the late Mr. J. McD. Stuart, a well-remembered explorer of Central Australia.

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS NATICA, *Adanson*, 1757.

(Hist. Nat Sénégal, Coquil, 1757, p. 172.)

Natica variabilis, *Moore.*

(Pl. vi., figs. 15-17.)

Natica variabilis, Moore, Quart. Journ. Geol. Soc., 1870, xxvi., p. 256, t. 10, f. 15.

Natica lineata, Etheridge, Quart. Journ. Geol. Soc., 1872, xxviii., p. 342, t. 21, f. 1.

Natica, sp., Hudleston, Geol. Mag., 1884, i. (3), p. 339, t. 11, f. 4.

Natica variabilis, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Natica variabilis, Eth. fil., Geol. Pal. Q'land, &c., 1892, pp. 485 and 573, t. 31, f. 2 and 3.

Obs.—Notwithstanding the frequent occurrence of this shell, the specimens are always so indifferent that it is at present impossible to say to what genus of Naticidæ it belongs.

Loc.—Beresford Springs, Lake Eyre South (*Brown*); Lake Eyre Basin (*Tate*); Mount Hamilton, twenty miles south-west of Lake Eyre, or else forty miles south-west of the Peake, Central South Australia (*Brown—Hudleston*).

Hor.—Lower Cretaceous.

Coll.—Tate; Brown; Natural History Museum, London.

GENUS ANCHURA, *Conrad*, 1860.

(Journ. Acad. Nat. Sci. Philadel., iv., p. 284.)

Anchura Wilkinsoni, *Eth. fil.*

(Pl vi., figs. 26-30)

Alaria or *Anchura sp.*, Hudleston, Geol. Mag., 1890, vii. (3), p. 242, t. 9, f. 2.

Anchura (?) *Wilkinsoni*, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 486, t. 31, f. 4 and 5.

Obs.—To the former characters given by me may be added the following :—The body whorl is obliquely flattened above the carina ; spire acutely conical ; beak mucronate, long, straight ; outer lip at its commencement of the same breadth as the body whorl, rapidly narrowing outwards, but the form of termination unknown.

Loc.—Lake Eyre Basin (*Tate*) ; Primrose Springs, near the Peake, Central South Australia (*Brown*).

Hor.—Lower Cretaceous.

Colln.—Tate ; and Natural History Museum, London.

CEPHALOPODA.

The paucity of Cephalopoda life in the Lower Cretaceous of South and Central Australia, with the exception of Belemnite remains, is very remarkable, only three fragments representing Ammonites having come under my notice—one in Mr. Brown's collection and two in Prof. Tate's. Mr. W. H. Hudleston figured a small form under the name of *Ammonites fontinalis*,* and Prof. Tate recorded the occurrence of *Crioceras australe*, Moore,† but this I have not seen. In the Cretaceous beds of Port Darwin, however, chambered-shell life seems to have been more prolific, as I have already had occasion to mention in the Introduction.

GENUS DESMOCERAS, *Zittel*, 1884.

(Handb. Pal., 1 Abth., Palæozoologie, ii., 1884, p. 465.)

Desmoceras carolensis, *sp. nov.*

(Pl. vii., figs. 2-5.)

Sp. Char.—Shell small, suborbicular, discoidal ; flanks gently rounded, or at times slightly compressed, convergent and divergent ; coil closely embracing ; abdominal angles rounded ; umbilicus only moderately wide, deep, and telescopic ; venter rounded ; impressed zone of dorsum deep and rather broad. Whorls numerous, oval, visible in the umbilicus, where they are almost straight-walled ; last whorl rapidly increasing in width forwards. Section higher than wide, oval, deeply hollowed on the dorsum. Constricting sulci six to eight on a whorl, transverse, rectangular, shallow, crossing the venter nearly in the same plane, only a very slight forward bending. Septa (in section) faintly sigmoidal ; sutures not highly complex ; lobes and saddles short ; ventral or siphonal lobe short and broad, terminating in two short digits; ventral or siphonal saddle very short and insignificant, of two small

* Geol. Mag., 1890, vii. (3), p. 241, t. 9, f. 1. † Proc. Aust. Assoc. Adv. Sci. for 1888 (1889), i. p. 230.

digits; first lateral saddle short and broad, apparently divided into two equal blunt digits and a few lateral divisions; first lateral lobe short and broad, with a central and two lateral digits; second lateral saddle less in width than the first, otherwise like it; second lateral lobe narrow; third lateral saddle very much shorter than the second. Cameræ wider than high.

Obs.—The general appearance of this Ammonite, and the presence of the constricting sulci appear to indicate the genus *Desmoceras*, as understood by Zittel. I prefer placing it here provisionally, as it appears to agree better with Zittel's conception of *Desmoceras* than it does either with *Puzosia*, Bayle (*emend.* De Grossouvre), *Schlueteria*, De Gross.; or *Hauericeras*, De Gross.,* offshoots from *Desmoceras*, and placed by Hyatt in the same family.†

The mode of preservation, or perhaps it is more correct to say conversion into a glazed impure ironstone has destroyed the sculpture, and rendered the finer details of the sutures indistinct, but the lobes and saddles appear to be much shorter (fore and aft) than in other allied forms. The digits also are very much less divided, both as to number of elements and depth of division. In these respects, as well in the general facies of the shell, it resembles *D. belus*, D'Orb. ‡ On the other hand, the intimate division of the sutural elements in *D. Guettardi*, D'Orb.,§ at once separates the latter from our species. In *D. Emerici*, D'Orb.,¶ the coil is more open, and there is a larger exposure of the inner whorls in the umbilicus.

We probably already possess a member of this group in our Lower Cretaceous, *D. Sutherlandi*, Etheridge, but the remarkable diminution in the size of the umbilicus, as compared with that of the shell generally, appears to be a distinctive character. In a recent publication¶ I referred this species to *Haploceras*, but possibly it is more nearly allied to *Desmoceras*.

The specific name is given in relation to the locality.

Loc.—Beach below Lighthouse, at Point Charles, Port Darwin *(Brown)*.

Hor.—Upper or Lower Cretaceous?

Colln.—Australian Museum, Sydney.

Genus Haploceras, *Zittel*, 1870.

(Ceph. Stramberger Schichten, 1870, p. 166.)

Obs.—The presence of this genus in the South Australian Cretaceous is indicated by a portion of a mudstone cast (Pl. vii., fig. 1) of what appears to be an aged example of *Haploceras Daintreei*, Etheridge,** obtained by Mr. Brown. It is part of one whorl,

* Mém. Explic. Carte Géol. Dèt. France, Ammonites Craie Sup., 1893, pp. 171, 216, 219.

† Zittel's Text Book Pal., 1900, i., p. 569.

‡ Pal. Franç. Terr. Crét (Cèphalopodes), 1841, i., Livr. 11, p. 166, t. 52, f. 4-6.

§ *Loc. cit.*, p. 169, t. 53, f. 1-3.

‖ *Loc. cit.*, p. 160, t. 51, f. 1-3.

¶ Bull. Geol. Survey Q'land, 1901, No. 13, p. 32.

** Quart. Journ. Geol. Soc., 1872, xxviii., t. 24.

retaining portions of the pearly testaceous layer, with a somewhat broad venter, and ornamented by regular arcuated equidistant costæ that pass over the latter.

Loc.—Dulkaninia Bore, at a depth of one thousand four hundred feet *(Brown).*

Hor.—Lower Cretaceous.

Colln.—Brown.

GENUS SCAPHITES, *Parkinson*, 1811.

(Organic Remains, 1811, iii., p. 145.)

Scaphites eruciformis, *sp. nov.*

(Pl. vii, figs. 10 and 11.)

Sp. Char.—Shell elliptical, short, the spire and distal end approximating closely to one another; spire occupying rather more than half the length of the shell. Whorls tightly coiled, outwardly convex; umbilicus small, round, or slightly pyriform; last or body whorl short, at first nearly straight, then forming a short broad crozier. Venter broad and convex throughout, but a little less rounded on the last whorl than on the spire. Mouth transversely oval. Sculpture consisting of numerous, regular, fine, transverse costæ, without tubercles. Length (of largest specimen) 22 mm.; transverse diameter of crozier, 16 mm.; transverse diameter of spiral, 13 mm.

Obs.—From the little that can be seen of the suture lines, the cameræ were evidently shallow. In form, this Scaphite is of the type of *S. æqualis*, Sby., as figured by D'Orbigny* and Dr. Clemens Schlüter† from the European Lower Chalk, and *S. Warreni*, var. *wyomingensis*, Meek.‡

I have ventured to apply a specific name to this shell, from the fact that I think my preliminary report § on the Point Charles fossils was the first recognition of the genus in Australian Cretaceous rocks. It will, in some measure, be of stratigraphical use in distinguishing the lower beds at Port Darwin. The trivial name is in allusion to the resemblance to a partially coiled caterpillar.

Loc.—Beach below Lighthouse, Point Charles, Port Darwin (*Brown.*)

Hor.—Upper or Lower Cretaceous?

Colln.—Australian Museum, Sydney.

GENUS AMALTHEUS, *De Montfort*, 1808.

(Conch. Syst., 1808, i., p. 91.)

Obs.—A partial impression of a small Ammonite (Pl. vii., fig 8) in Prof. Tate's collection in all probability leads to the recognition of this genus in the Lake Eyre beds. It

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* Pal. Franç. Terr. Crét (Céphalopodes), 1842, i., Livr. 32, p. 518, t. 129, f. 1-7.

† Palaeontographica, 1872, xxi., Lief. 2, t. 23, f. 1-4.

‡ Report U.S. Geol. Survey Territories (Hayden's), 1876, ix., p. 421, f. 61-63.

§ S. Austr. Parl. Papers, 1893, No. 82, p. 33.

closely resembles *A. fontinalis*, Hudleston,* which in my opinion is only the young condition of *A. olene*, Ten. Woods.†

Loc.—Lake Eyre Basin (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS HAMITES, *Parkinson*, 1811.

(Organic Remains, 1811, iii., p. 144.)

Hamites, *sp. ind.*

(Pl. vii., figs. 12 and 13.)

Obs.—Four fragments are cautiously referred to this genus. The costæ are single and simple, without nodes or tubercles of any kind, cross the venter without interruption, and to all intents and purposes disappear at the edges of the dorsum, leaving that area plain. They are rounded, and separated from one another by intercostal spaces of uniform width, that being equal to the width of the costæ. On the sides the latter are at right angles to the longest diameter of the shell, and do not roll in their course. There is a resemblance to *Hamites virgulatus* (Brong.), D'Orb.‡

The longest of the fragments is rather too openly curved for a Hamite, hence I hesitate to some extent in the determination; but should it prove correct my earlier reference§ will, I believe, be the first enunciation of this genus in our Cretaceous rocks.

Loc.—Beach below Lighthouse, Point Charles, Port Darwin *(Brown).*

Hor.—Upper, or Lower Cretaceous ?

Colln.—Australian Museum, Sydney.

GENUS ANCYLOCERAS, *D'Orbigny*, 1842.

(Pal. Franç. Terr. Crét. (Céphalopodes), 1842, i., Livr. 33-42, p. 491.)

Obs.—One fragmentary specimen (Pl. vii., figs. 14 and 15) is of a doubtful nature similarly to the Hamite. It is that portion of the shell near the proximal coil. The costæ are numerous in a given space and narrow, and with a row of tubercles on both sides the venter, larger and smaller alternately. The former are slightly convex towards the mouth on the venter, oblique on the sides, and nearly horizontal on the dorsum. The sutural line is comparatively simple, and the subdivision of the lobes and saddles few in number.

According to Hyatt's classification the presence of tubercles precludes a reference both to the Hamitidæ and Macroscaphitidæ, but the specimen may possibly be an *Ancyloceras* near *A. dilatatus*, D'Orb.,‖ or *A. furcatus*, D'Orb.¶

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* Geol. Mag., 1890, vii. (3). p. 241, t. 9, f. 1.

† Journ. R. Soc. N.S. Wales for 1882 (1883), p. 150, t, 7, f. 2, t. 8, f. 1.

‡ Pal. Franç. Terr. Crét. (Céphalopodes), 1842, i., Livr. 33-42, p. 545, t. 134, f. 1-4.

§ S. Austr. Parl. Papers, 1893, No. 82, p. 33.

‖ Pal. Franç. Terr. Crét (Céphalopodes), 1842, i., Livr. 32-43, p. 494, t. 121, f. 1 and 2.

¶ *Ibid.*, p. 509, t. 127, f. 8-12.

Loc.—Beach below Lighthouse, Point Charles, Port Darwin (*Brown.*)
Hor.—Upper, or Lower Cretaceous?
Colln.—Australian Museum, Sydney.

GENUS HISTRICHOCERAS, *Hyatt*, 1900.

(Zittel-Eastman's Text Book Pal., 1900, i., p. 589.)

Histrichoceras (?), *sp. ind.*

(Pl. vii., figs. 6 and 7.)

Obs.—Three fragments that in some of their characters recall *H. varians*, Sby. sp., are provisionally referred to this genus. Two are portions of whorls only, the remaining specimen consists of parts of three conjoined whorls. The latter have a quadrangular section, are on the whole somewhat compressed, and flattened on the flanks, which appear to be slightly convergent. The venter is rounded with a median sharp and projecting keel, guarded on each side by a slight depression or spiral groove, the grooves bounded along the abdominal angles by round and pronounced tubercles. A circlet of smaller tubercles occurs around the umbilical edge, and from these the costæ radiate across the flanks to the other protuberances already mentioned; some of the costæ are simple, others bifurcate. The impressed zone of the dorsum is deeply excavate, with a sharp well-defined furrow for the reception of the keel of the embraced whorl, and marked bilateral depressions to receive the abdominal tubercles of the latter.

Ammonites varians, Sby., forms the type of *Histrichoceras*, and from a general resemblance borne by these fossils to that species I place them near it, although the whorls do not show the same rapid expansion as in *H. varians.*

Loc.—Beach below Lighthouse, Point Charles, Port Darwin (*Brown*).
Hor.—Upper or Lower Cretaceous?
Colln.—Australian Museum, Sydney.

GENUS BUCHICERAS, *Hyatt.*, 1875?

(Proc. Boston Soc. Nat. Hist., 1875, xvii, p. 367.)

Obs.—In Tate's collection is the half of a very small but interesting Ammonite (Pl. vii., fig. 9), partially enclosed in matrix, bearing a label in his handwriting—"*Buchiceras?*"

The sutures certainly possess a Ceratiti-form appearance, with remarkably simple round and plain lobes and saddles, without digitations. The venter of the outer whorl seems to have a very minute keel, but that of one of the innermost whorls, where exposed, is certainly rounded, although not broad. The lobes and saddles are unsymmetrical in outline, and the first and second lateral saddles each have an excentric V-shaped nick, and this is the only sign of subdivision visible. The general outline is that of *Buchiceras vibrayeanum*, D'Orb.,* the lobes and saddles being equally simple, with the exceptions above mentioned,

* Pal. Franç. Terr. Crét. (Céphalopodes), 1841, i., p. 322, t. 96, f. 1-3.

but the saddles are wider in proportion to its size than those of D'Orbigny's species. It may be a member of the Tissotidæ, but as the longitudinal diameter is only nine millimetres, and the literature of this group at my disposal scanty, I am not able to follow the matter further. The little shell I formerly suggested to be the young of *Haploceras Daintreei** is by no means unlike it.

Loc.—Lake Eyre Basin *(Tate).*

Hor.—Lower Cretaceous.

Colln.—Tate.

GENUS BELEMNITES (*G. Agricola*), *Lamarck*, 1749.

(Mèm. Soc. Hist. Nat. Paris, 1799.)

Obs.—The Belemnitidæ of Australia are in a far from satisfactory condition. The species at present determined are :—

OOLITIC.

Belemnites canaliculatus (Schl.), *Moore.*

CRETACEOUS.

Belemnites australis, *Phill.*

Belemnites Canhami, *Tate.*

Belemnites oxys, *Ten. Woods.*

Belemnites Sellheimi, *Ten. Woods.*

Belemnites eremos, *Tate*=B. paxillosus (*Schl.*) *Phill.*

Belemnites ? Liversidgei, *Eth. fil.*

The Oolitic species from Western Australia, the validity of which rests simply on a figure given by Moore,† is probably referable to *Belemnopsis*, and *B.* (?) *Liversidgei*, mihi, possibly belongs to the same genus. *B. Sellheimi*, Ten. Woods, is simply known in the phragmocone state. The four remaining species are allied forms of another section of the genus characterised by the presence of more or less long dorso-lateral furrows, and the absence of both apical, ventral, and true dorsal furrows.

In Dr. S. P. Woodward's classification‡ these four species would fall into Section 1 —*Acœli*, without dorsal or ventral grooves; Sub-section 2—*Clavati*, with lateral grooves. In the later grouping given by Hyatt,§ however, our Belemnites find no place.

Belemnites oxys, *Ten. Woods.*

Belemnites australis, Tate (*non* Phillips, *nec* Hector), Trans. Phil. Soc. S. Austr. for 1878-79 (1879), ii., p. l.

Second Species of Belemnites, Tate, Trans. R. Soc S. Austr. for 1879-80 (1880), iii., p. 105.

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* Geol. Pal. Q'land, &c., 1892, t. 30, f. 5 and 6.

† Quart. Journ. Geol. Soc., 1870, xxvi., p. 232, t. 16, f. 7.

‡ Man. Moll., 1851, p. 73.

§ Zittel-Eastman's Text Book Pal., 1900, i., pp. 595-97.

Belemnites australis, Ten. Woods, Proc. Linn. Soc. N.S. Wales, 1883, viii., Pt. 2, p. 236.
Belemnites oxys, Ten. Woods, Proc. Linn. Soc. N.S. Wales, 1883, viii., Pt. 2, p. 237, t. 13, f. 1-3.
Belemnites australis, Tate, Trans. R. Soc. S. Austr. for 1885-86 (1887), ix., p. 53.
Belemnites australis, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.
Belemnites oxys, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 488.

Obs.—To this species I ascribe four portions of guards, referred with doubt throughout his writings by Prof. Tate to *B. australis*, Phill. One of these possesses diameters of $1\frac{1}{16}''$ x $\frac{7}{8}''$ at three inches from the apex; a second $\frac{13}{16}''$ x $\frac{7}{8}''$ at three and a-half inches from the apex. The ventral faces are flattened, and the lateral grooves very sharply cut, approaching the ventral face in the alveolar region, thence curving towards the dorsal, but I have not been able to detect any trace of a continuance of them in the form of fine striæ as described by Phillips in *B. australis*. These specimens have a much more prolonged apical or distal end than is shown in Moore's figures* of the latter species. In the present state of our knowledge it is always possible to distinguish the two forms by this means, and although I am far from denying that by the assemblage of a sufficient number of specimens connecting links may be found, yet for the present the forms represented by the names *B. australis*, Phill. (restricted), and *B. oxys*, Ten. Woods, must be kept separate. It is quite clear that in naming this Belmenite *B. australis*, Prof. Tate was in doubt as to the correctness of his determination, for he says—"A second species of Belemnites (incorrectly referred by me to *B. australis, vide* Trans. Phil. Soc., p. l., 1879) occurs in association with the before-mentioned lamellibranchs at Mount Margaret."† Again, in giving a list of Cretaceous fossils collected by the late Mr. Gavin Scoular,‡ he recorded the species as "*Belemnites australis*, Phillips (?)"

Loc.—Vicinity of the Peake, Central South Australia (*J. Canham* §); Mount Margaret, west of Lake Eyre North (*R. Beetson* ‖); Davenport, or Humphrey Spring, Lake Eyre South (*G. Scoular*).¶

Hor.—Lower Cretaceous.
Colln.—Tate.

Belemnites Canhami, *Tate.*

Belemnitella diptycha, McCoy (*m.s.*), Ann. Mag. Nat. Hist., 1867, xix. (3), p. 356.
Belemnitella diptycha, McCoy (*m.s.*), *Ibid*, 1867, xx. (3), p. 196.
Belemnitella diptycha, McCoy (*m.s.*), Trans. R. Soc. Vict., 1868, viii., Pt. i., p. 42.
Belemnites australis, Phillips in Moore (*non* Hector), Quart. Journ. Geol. Soc., 1870, xxvi. t. 16, f. 3 and 4 (*excl.* f. 1, 2, and 5).

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* Quart. Journ. Geol. Soc., 1870, xxvi., t. 16, f. 1-2 (excl. f. 3 and 4.)
† Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 105.
‡ *Ibid.* for 1885-86 (1887), ix., p. 53.
§ Tate, Trans. Phil. Soc. S. Austr. for 1878-79 (1879), ii., p. 2.
‖ Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 105.
¶ Tate, *Ibid.* for 1885-86 (1887), ix., p. 53.

Belemnites Canhami, Tate (*m.s*), Trans. Phil. Soc. S. Austr. for 1878-79 (1879), ii., p. l.

Belemnites Canhami, Tate, Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 104, t. 4, f 2*a-c*.

Belemnites Canhami, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., p. 230.

Belemnites Canhami, Eth. fil., Geol. Pal. Q'land, &c., 1892, p 490, t. 35, f. 3 and 4, 7-9, 12-14.

Obs.—Six specimens represent this species in Tate's collection, one is the type, and another exhibits a portion of the phragmocone *in situ* The type figure is that of an aged specimen, and is to some extent misleading in that the lateral grooves are not continued to the guard apex, nor does the latter terminate in a mucro. Both these characters are, however, present in the younger individuals.

I observe the same variability in form in the South Australian specimens as in those from Queensland, *i.e*, from the flat spathulate outline to a rounder and more globose condition.

This species seems to have been first referred to by Prof. Tate in his paper—"On New Species of *Belemnites* and *Salenia* from the Middle Tertiaries of South Australia," wherein he says :—"I have a Belemnite from the interior of the province which resembles *B. gingensis* of the European Oolite." I fail to see more than a very general resemblance to *B. gingensis*, and have already pointed out how much closer it is to certain Cretaceous species in form, although these are otherwise distinct.

Loc.—Wood-duck Creek, near the Peake, Central South Australia (*J. Canham* and *J. Chandler.**)

Hor.—Lower Cretaceous.

Colln.—Tate.

Belemnites Sellheimi, *Ten. Woods.*

(Pl. vii., figs. 16 and 17.)

(*?*) *Belemnites Barklyi*, Clarke (*m.s.*), Quart. Journ. Geol. Soc., 1862, xviii., p. 246.

Belemnites Selheimi, Ten. Woods, Journ. R. Soc. N S. Wales for 1882 (1883), xvi., p. 150, t. 7, f. 1.

Belemnites Selheimi, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), p. 230.

Belemnites Sellheimi, Eth. fil., Geol. Pal. Q'land., &c., 1892, p. 489, t. 35, f. 10 and 11.

Obs.—It must not be forgotten that this name applies to a phragmocone only, and that so far its relation to any particular guard has not been established.

The phragmocone in Prof. Tate's collection is two and three-quarter inches long, with a proximal diameter of about one and a half inches in both directions. The whole of the cameræ are not present at either end, but within the length mentioned there are twenty-three shallow chambers. The septa were gently concave; the depth of the cameræ measured between the sutures is at the proximal end two-sixteenths of an inch, and at the distal one-sixteenth of an inch. The outline of the sutures forms two sigmoidal curves united. The

* Tate, Trans. R. Soc. S. Austr. for 1879-80 (1880), iii., p. 105.

surface of one of the conothecal layers retains waved concentric microscopic laminæ. The siphuncle at the proximal end is hidden by matrix; at the distal it is marginal.

Loc.—Lake Eyre Basin *(Tate)*.

Hor.—Lower Cretaceous.

Colln.—Tate.

Belemnites eremos, *Tate.*

(Pl. vii., figs. 18-21.)

Belemnites paxillosus, Phillips in Moore (*non* Schlotheim), Quart. Journ. Geol Soc., 1870, xxvi., pp. 240 and 259, t. 16, f. 6, 6*a* and *b*.

New Species allied to B australis, Tate, Quart. Journ. Geol. Soc., 1877, xxxiii., p. 258.

Belemnites allied to B. australis, Tate, Trans. Phil. Soc. S. Australia for 1878-79 (1879), ii., p. xlviii.

Belemnites eremos, Tate, Proc. Austr. Assoc. Adv. Sci. for 1888 (1889), i., pp. 229-30.

Belemnites eremos, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 488, t. 35, f. 6.

Obs.—The guard in this Belemnite is cylindrical-hastate, long, slender, gradually tapering, and thin over the proximal end of the phragmocone. The dorso-lateral furrows are sharply impressed and deep, at first oblique, then curving slightly in the post-alveolar region, and continuing on the sides as faint lines nearly to the apex. The alveolus is excentric, and the phragmocone both small and smooth, with an elliptical section. The axial canal of the guard is slightly curved, and extends to the apex; the siphuncle is enclosed.

This form was first referred to by Prof. Tate as a "New Species allied to *B. australis,* Phillips," then identified with the *B. paxillosus,* Phill., but not of Schlotheim, and afterwards erected into a separate species as *B. eremos.*

Loc.—Stuart's, formerly Cooper's Creek, Central South Australia (*Tate*).

Hor.—Lower Cretaceous.

Colln.—Tate.

PALÆONTOLOGICAL HISTORY.

(ADDENDA.)

1883. Mr. E. B. Sanger contributed a paper on the "Geology of Central Australia."* He gave a section in the Peake and Mount Margaret chain, to the west of Lake Eyre North of "Jurassic" rocks resting unconformably on Cambrian. To the former is referred a compact grey shell limestone, gypsiferous marlites, and sandstones; the limestone containing the following fossils :†—

Monotis curta *(?)*.
Mytilus minimus *(? Sby.)*.
Mytilus ingens, *Ten. Woods.*
Lima gigantea *(? Sby.)*.
Cardinia Listeri *(? Stutchbury)*.
Cucullæa oblonga *(? Sby.)*.

and species of *Tancredia, Cytherea, Avicula, Pecten, Modiola,* and *Pleurotomaria.*

In the gypsiferous marlites are calcified Belemnites—*Belemnites canaliculatus* (? Schl.) and *B. densus* (?). With one exception, the writer does not mention the authors of the species quoted; I have supplied the possible names, but the forms in question have not been seen by me, and I do not think they occur in the district mentioned, except perhaps *M. ingens*, Ten. Woods.

1899. In a "Guide to the Museum of the South Australian School of Mines and Industries," &c., Prof. R. Tate gave a list of Australian Cretaceous fossils, containing certain MS. names that I have not had an opportunity of verifying; they are not, with one exception, attached to any of the specimens in his collection.‡

CORRIGENDA.

Pl. iv., figs. 4-7—For *Trigonia cinctura* read *Trigonia cinctuta.*
Pl. vi., figs. 6 and 7—For *Nucula truncata*, Etheridge, read *Nucula truncata*, Moore.
Pl. vi., figs. 8-13—For *Cyrena (?) Meeki*, read *Corbicula (?) Meeki.*
Pl. vii., figs. 16-17—For *Belemnites Selheimi*, read *Belemnites Sellheimi.*

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* American Nat., 1883, xvii., No. 11, pp. 1117-1134.
† *Ibid*, p. 1124.
‡ Ann. Report S. Austr. School Mines and Ind. for 1898 (1899), p. 191.

INDEX TO THE GENERA AND SPECIES DESCRIBED.

(The Synonyms are in Italics.)

PLATE I.

LINGULA SUBOVALIS, *Davidson.*

Fig. 1. The convex or ventral valve—× 3. The Peake, Central South Australia. Collection Tate.

RHYNCHONELLA EYREI, *Eth. fil.*

" 2. The dorsal valve and ventral umbo, &c. Lake Eyre Basin. Collection Tate.

MACCOYELLA BARKLYI, *Moore, sp.*

" 3. The left or convex valve exhibiting the costæ and fistulose spines. Beresford Springs, Lake Eyre South.

" 4. The right or flat valve, with its chondrophoral button and byssal sinus. Above is seen the left umbo and the anterior scobinate lamellæ. Beresford Springs, Lake Eyre South. Collection Brown.

" 5. Interior (part) of the right or flat valve, chondrophoral button, byssal sinus, and adductor impression. Lake Eyre Basin. Collection Tate.

" 6. The left or convex valve more or less exfoliated, but showing the posterior alation, and the primary costæ extending beyond the ventral margin as free spines. Lake Eyre Basin. Collection Tate.

" 7. The left or convex valve entirely exfoliated, showing the adductor impression. (This specimen was labelled *Avicula alata*, Eth., by Prof. Tate.) Lake Eyre Basin. Collection Tate.

MACCOYELLA UMBONALIS, *Moore, sp.*

" 8. The right or flat valve and the cardinal margin of the left or convex valve. Lake Eyre Basin. Collection Tate.

MACCOYELLA CORBIENSIS, *Moore, sp.*

" 9. The left or convex valve—a gypseous cast.

" 10. Interior of the same.

Primrose Springs, near the Peake, Central South Australia. Collection Tate.

SYNCYCLONEMA (?) SOCIALIS, *Moore, sp.*

" 11. Concavo-convex valve, with traces of the radiating costæ around the margin.

" 12. Convex valve, showing the same, and position of adductor impression. These valves are in apposition. Primrose Springs, near the Peake, Central South Australia. Collection M. and G. Museum.

PECTEN, *sp. ind.*

" 13. Portion of an exfoliated valve, with a remarkably large triangular auricle—× 3. The Peake, Central South Australia. Collection Tate.

PROTAMUSIUM (?) GRADATUM, *Eth. fil.*

" 14. Portion of a valve with slightly elevated auricles, and traces of the step-like concentric laminæ. The adductor scar is faintly seen. Lake Eyre Basin. Collection Tate.

PTERIA TATEI, *Eth. fil.*

" 15. A much exfoliated example of the valves in apposition, the right visible. The groove under the cardinal margin and the series of muscular attachments on the pallial line are also visible. Lake Eyre Basin. Collection Tate.


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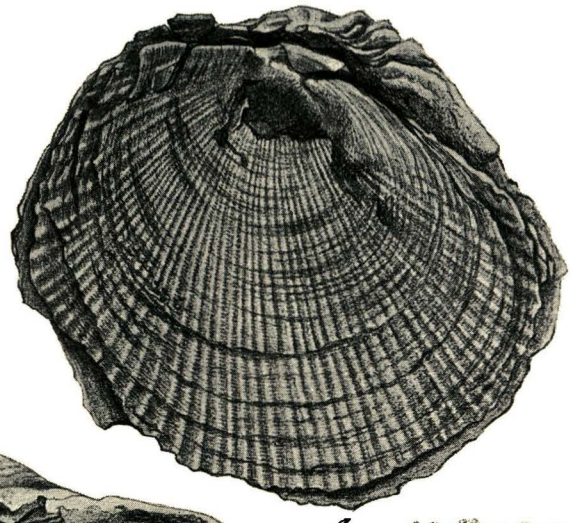
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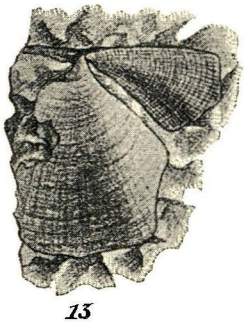
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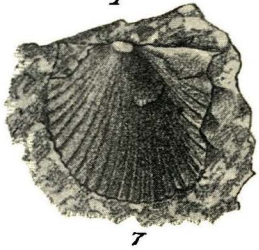
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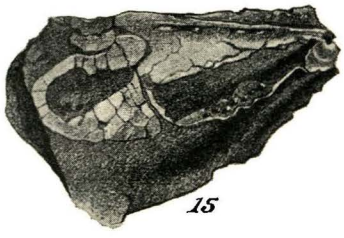
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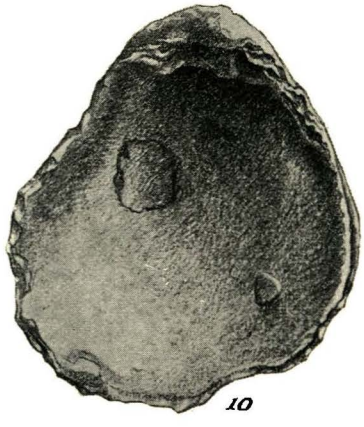
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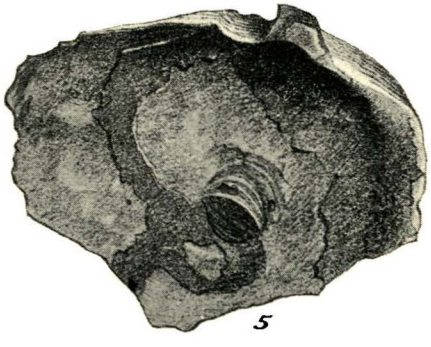
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PLATE II.

PSEUDAVICULA ANOMALA, *Moore, sp.*

Fig. 1. Portion of a bore-core, exhibiting one of its surfaces crammed with crushed examples of this species. Hergott Springs Bore, Central South Australia.

PSEUDAVICULA AUSTRALIS, *Moore, sp.*

" 2. Two valves pressed together, and exfoliated. The adductor scar is visible near the centre. Lake Eyre Basin. Collection Tate.

INOCERAMUS, *sp. ind.*

" 3. A much mutilated gypseous cast—the only evidence I have seen of the genus in South Australian Cretaceous rocks. Collection Brown.

RADULA RANDSI, *Eth. fil.*

" 4. Portion of an exfoliated valve, exhibiting the sharp and regular costæ, few in number. Primrose Springs, near the Peake, Central South Australia. Collection Tate.

MODIOLA EYRENSIS, *Eth. fil.*

" 5. Internal cast, lateral view.
" 6. The same specimen, dorsal view.
" 7. " " ventral view.
Beresford Springs, Lake Eyre South.
" 8. A rather smaller individual, the valves slightly displaced, and with traces of the concentric ornament.
" 9. The same specimen, ventral view.
Stuart's Creek, Central South Australia. Collection Tate.

MODIOLA TATEI, *Eth. fil.*

" 10. A much exfoliated example, side view.
" 11. The same specimen, dorsal view, with traces of the ligament.
Stuart's Creek, Central South Australia. Collection Tate.

MYTILUS INFLATUS, *Moore.*

" 12. A well preserved testaceous example. Fred's Springs, Lake Eyre South.
" 13. Reproduction of Mr. W. H. Hudleston's type of his *Modiola linguloides* (Geol. Mag., 1884, i. (3), t. 11, f. 6*a*), lateral view.
" 14. Anterior view of the same reproduction, exhibiting the inrolled umbos. (*Ibid, loc. cit.*, f. 6*b*.)
" 15. Dorsal view, again of the same reproduction.
Cootanoorina, west of the Peake, Central South Australia.
" 16. The umbos seen from the anterior—× 2.
" 17. The same specimen viewed dorsally, exhibiting the escutcheon—× 2.
Fred's Springs, Lake Eyre South. Collection Brown.
" 18. Internal cast of a rather tumid variety, displaying the cast of the ligament and the adductor scar.
Fred's Springs, Lake Eyre South. Collection Brown.
" 19. Internal cast of a specimen, analagous to fig. 12, lateral view.
" 20. The same specimen, dorsal view, displaying the escutcheon.
" 21. The same specimen again, anterior and ventral view.
Fred's Springs, Lake Eyre South. Collection Brown.

MYTILUS PRIMULAFONSENSIS, *Eth. fil.*

" 22. Lateral view, exhibiting the adductor scar.
" 23. Dorsal view, showing the escutcheon.
" 24. Anterior and ventral view, with the small umbos.
Primrose Springs, near the Peake, Central South Australia. Collection M. and G. Museum.

TATELLA MARANOANA, *Eth. fil.*

" 25. Testaceous example, displaying the form of the shell, but slightly broken at the posterior extremity. Lake Eyre Basin. Collection Tate.
" 26. Internal cast exhibiting the spoon-shaped depression on the anterior, with the ligament, and a portion of the adductor scar below a fragment of test on the posterior end. The Peake, Central South Australia. Collection Tate.


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PLATE III.

MYTILUS RUGOCOSTATUS, *Moore.*

Fig. 1. Exfoliated left valve, with a somewhat expanded posterior end.
" 2. Ventral view of the same specimen (fig. 1).
" 3. Dorsal view of fig. 1.
" 4. Another exfoliated specimen, with a less expanded posterior end.
" 5. A less curved form, with the concentric rugæ preserved on the posterior portions.
" 6. An example with a straighter cardinal margin, and less curved ventrally.
" 7. A smaller individual, with the characteristic umbonal plicæ preserved.
This series of seven figures exemplifies in a marked manner the variability of outline in this species, and the manner in which the posterior slopes overhang the ventral margin.
Springs, south shore of Lake Eyre. Collection Brown.

MODIOLA ENSIFORMIS, *Eth. fil.*

" 8. Right valve showing the divergent cardinal and ventral margins, the acute diagonal ridge, and small protuberant anterior end.
" 9. Another similar example.
" 10. Ventral view of fig. 9.
Springs, south shore of Lake Eyre. Collection Brown.
" 11. A smaller example, somewhat shorter in proportion to its size.
" 12. Dorsal or cardinal view of fig. 11.
Davenport Springs. Collection Tate.

NUCULA QUADRATA, *Etheridge.*

" 13. Left valve of an exfoliated specimen, showing traces of posterior cardinal teeth; the general surface is nacreous. Primrose Springs. Collection M. and G. Museum.
" 14. Internal cast left valve, with the adductor scars and supplementary scars in the umbonal region. Lake Eyre Basin. Collection Tate.

NUCULA (?), *sp. ind.*

" 15. Internal cast left valve, with a less tumid outline than that of *N. quadrata*, Etheridge.
" 16. Dorsal view of the same.
Lake Eyre Basin. Collection Tate.

NUCULA TRUNCATA, *Moore.*

" 17. Left valve of a specimen enclosed in matrix, exhibiting a triangular-truncate outline and fine concentric sculpture.
" 18. Another example, an internal cast of the left valve, showing the posterior adductor scar.
" 19. Ventral view of fig. 18.
" 20. Dorsal view of fig. 18.
Lake Eyre Basin. Collection Tate.

MALLETIA ELONGATA, *Etheridge.*

" 21. An example imperfect at the ends, with a portion of the test remaining.
" 22. Dorsal view of another specimen, showing the hinge teeth.
" 23. Right valve of fig. 22, exhibiting the pallial sinus and pallial tongue— × 2.
" 24. Partial right valve of a large individual more or less enveloped in matrix.
Lake Eyre Basin. Collection Tate.

TRIGONIA LINEATA, *Moore*

" 25. A more or less exfoliated specimen.
" 26. Dorsal view of the same.
Lake Eyre Basin. Collection Tate.

ISOCARDIA (?) TATEI, *Eth. fil.*

" 27. Left valve partly testaceous, partly an internal cast; the anterior adductor scar is visible. Lake Eyre Basin. Collection Tate.

TATELLA MARANOANA, *Eth. fil.*

" 28. Internal cast, exhibiting adductor impressions and pallial line.
" 29. Hinge of fig. 28 from a wax cast.
Lake Eyre Basin. Collection Tate.


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PLATE IV.

IDONEARCA ROBUSTA, *Etheridge, sp.*

Fig. 1. Left valve of a mutilated internal cast, exhibiting the adductor scars, pallial line, and traces of horizontal lateral teeth.

" 2. Ventral view of fig. 1.

" 3. Dorsal view of fig. 1, exhibiting impression of the cardinal teeth.
Lake Eyre Basin. Collection Tate.

TRIGONIA CINCTURA, *Eth. fil.*

" 4. Left valve, exhibiting sculpture and cincture.

" 5. Interior of fig. 4.

" 6. Jelly cast of the interior (fig 5).
Collection Brown.

" 7. Matrix cast of another specimen referred to this species. Lake Eyre Basin. Collection Tate.

GLYCIMERIS RUGOSA, *Moore, sp.*

" 8. Left valve, partly testaceous.

" 9. Dorsal view of fig. 8.
Lake Eyre Basin. Collection Tate.

" 12. Young shell believed to be the same species. Springs, south shore of Lake Eyre. Collection Brown.

GLYCIMERIS MCCOYI, *Moore, sp.*

" 10. Left valve, decorticated.

" 11. Dorsal view of fig. 10.
Lake Eyre Basin. Collection Tate.

ISOCARDIA (?) TATEI, *Eth. fil.*

" 13. Dorsal view of shell figured Pl. iii., fig. 27, showing pits along each side the cardinal area, piercing the test— × 2.

" 14. Anterior view of the same specimen exhibiting similar holes in the lunule— × 2.
Lake Eyre Basin. Collection Tate.

TELLINA, *sp. ind.*

" 15. Internal cast, left valve. Lake Eyre Basin. Collection Tate.

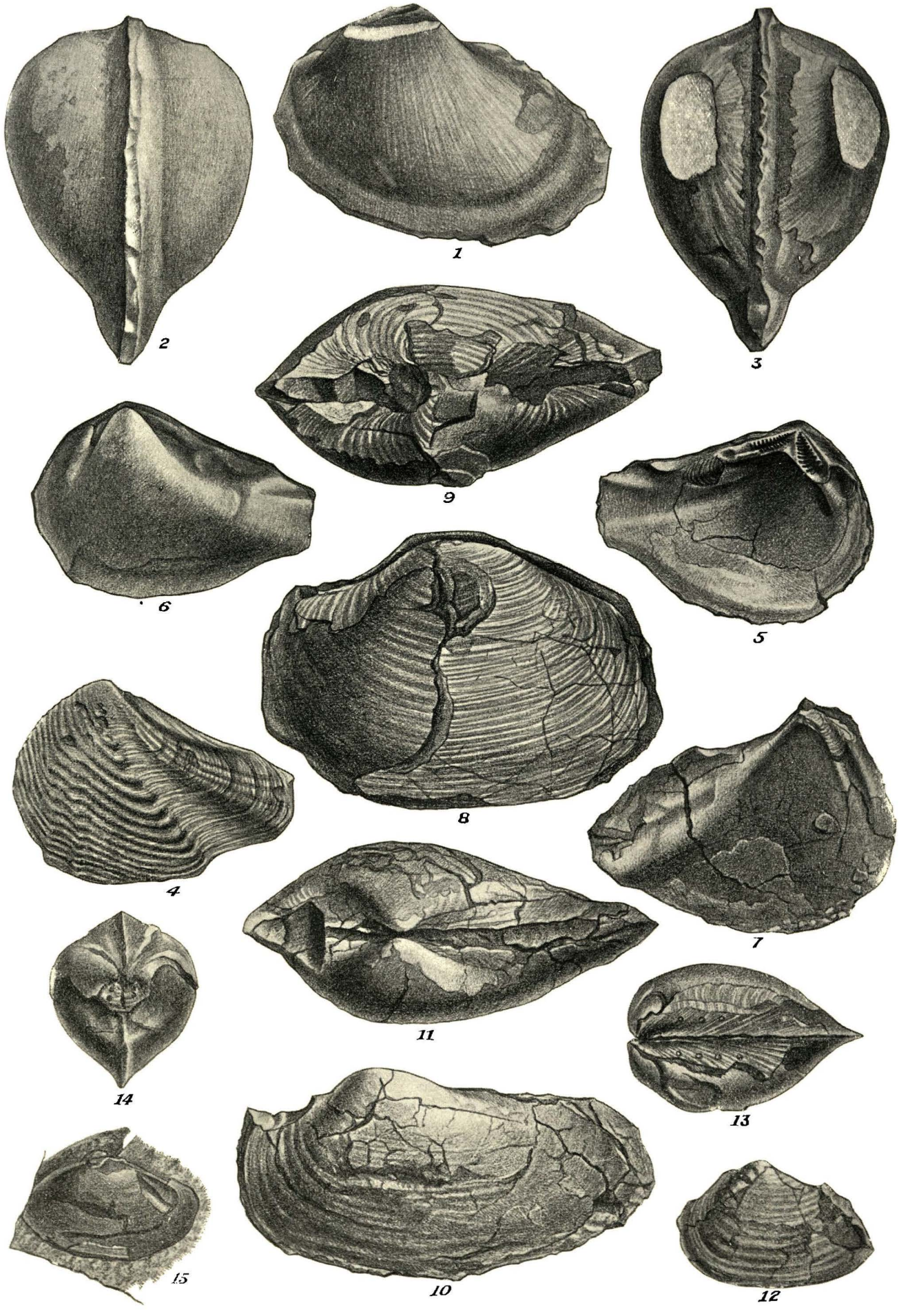
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PLATE V.

GLYCIMERIS EYRENSIS, *Eth. fil.*

Fig. 1. Internal cast, left valve; the sub-central scar is probably that of a Cirripede.
" 2. Dorsal view of fig. 1, exhibiting the anterior and posterior gapes, and the ligament represented by protruding matrix.
Beresford Springs. Collection Brown.

PHOLADOMYA EBAENSIS, *Eth. fil.*

" 3. Internal cast, left valve.
" 4. Dorsal view of fig. 3.
Mount Eba. Collection Brown.

CYPRINA CLARKEI, *Moore, sp.*

" 5. Left valve, partly testaceous; the sculpture is well seen.
" 5A. Sculpture enlarged.
" 6. Dorsal view of fig. 5, exhibiting the attenuated anterior ends.
Lake Eyre Basin. Collection Tate.

MACROCALLISTA (?) PLANA, *Moore, sp.*

" 7. Right valve, internal cast, showing position of the anterior adductor scar.
" 8. Dorsal view of fig. 7.
Beresford Springs. Collection Brown.
" 9. Right valve, partly testaceous. Lake Eyre Basin. Collection Tate.
" 10. Dorsal view of fig. 9.
This form is only referred to *Macrocallista* provisionally.

CYTHEREA (?) SUBAURITA, *Eth. fil.*

" 11. Dorsal view of fig. 12, showing ligament and thickness of the united valves.
" 12. Right valve, partly testaceous.
Stuart's Creek. Collection Tate.

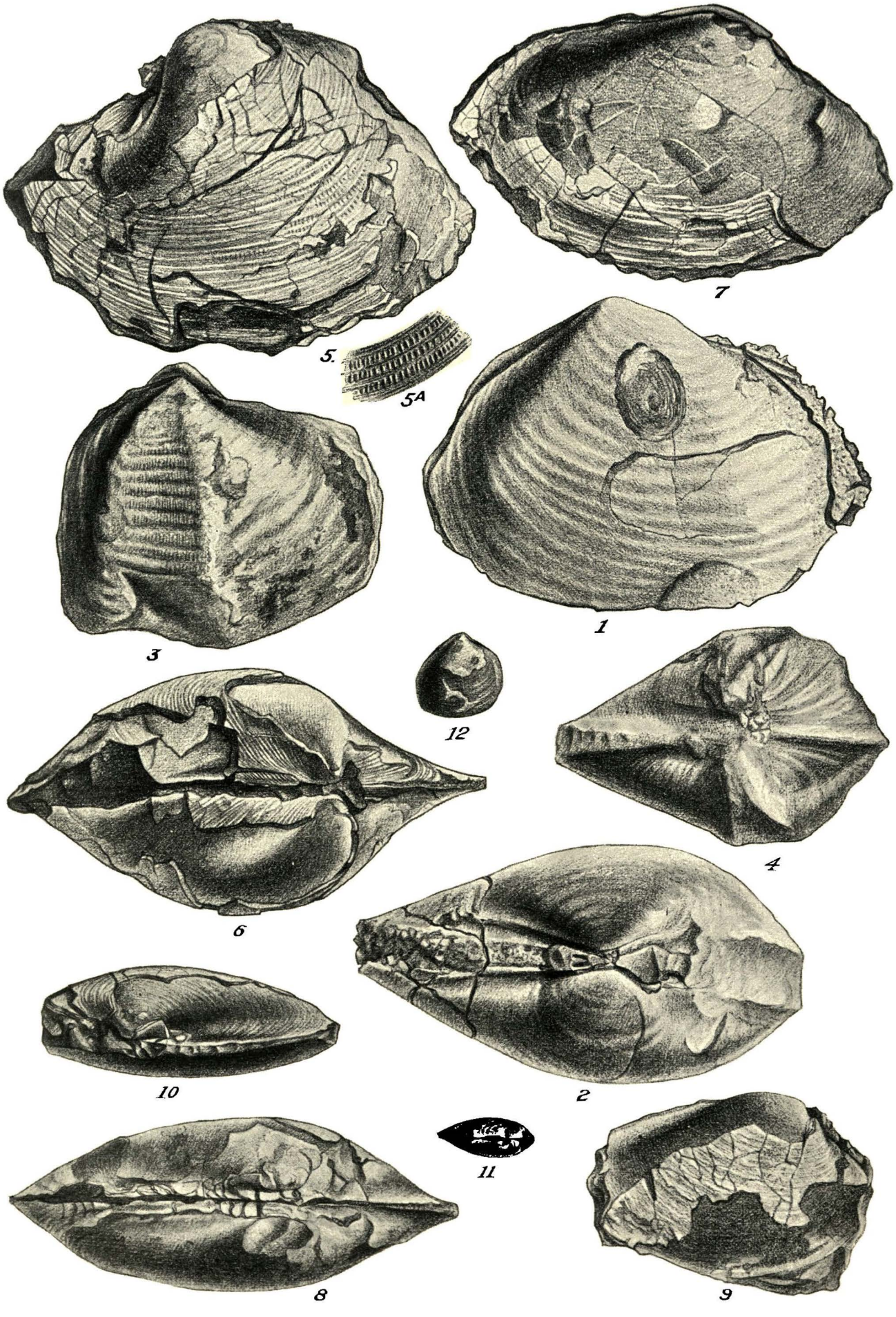
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PLATE VI.

CYPRINA CLARKEI, *Moore, sp.*

Fig. 1. Mutilated and partly testaceous specimen right valve.
" 2. Dorsal view of fig. 1, the left valve crushed.
Springs along south shore of Lake Eyre. Collection Brown.

CARDIUM (?) BROWNI, *Eth. fil.*

" 3. Left (?) valve internal cast.
" 4. Another specimen left (?) valve, partly testaceous.
" 5. Dorsal view of fig. 4.
Lake Eyre Basin. Collection Tate.

NUCULA TRUNCATA, *Etheridge.*

" 6. Right valve partly testaceous.
" 7. Dorsal view of fig. 6, showing hinge teeth.
Primrose Springs. Collection M. and G. Museum.

CYRENA (?) MEEKI, *Eth. fil.*

" 8. Testaceous right valve, but exfoliated.
" 9. Another right valve in the same condition.
" 10. Dorsal view of fig. 9.
" 11. Partial hinge of a left valve of another specimen, showing central triangular cardinal tooth.
" 12. Internal cast of a right valve, showing positions of adductor scars and pallial line.
" 13. Dorsal view of another specimen, with remains of the cardinal teeth exposed.
Lake Eyre Basin. Collection Tate.

MALLETIA ELONGATA, *Etheridge, sp.*

" 14. Internal cast, with remains of test, showing the pallial line and sinus. Primrose Springs. Collection M. and G. Museum.

NATICA VARIABILIS, *Moore.*

" 15. Exfoliated example, consisting of the body and penultimate whorls.
" 16. Another more perfect specimen; almost a complete internal cast.
Beresford Springs. Collection Brown.
" 17. A specimen having the general characters of *N. variabilis*, but the penultimate whorl costate and the body whorl highly corrugate, showing a transition to *Vanikoropsis* (?) *Stuarti*. Beresford Springs. Collection Brown.

VANIKOROPSIS (?) STUARTI, *Eth. fil.*

" 18. Dorsal view of a nearly complete specimen.
" 19. Sculpture as seen on the body whorl of fig. 18, enlarged.
" 20. Ventral aspect of fig. 18, showing a reflected inner lip.
Lake Eyre Basin. Collection Tate.

DELPHINULA (?) STURTI, *Eth. fil.*

" 21. Portion of a body whorl.
" 22. Sculpture seen on fig. 21, enlarged.
Lake Eyre Basin. Collection Tate.

DITREMARIA (?) CRETACEA, *Eth. fil.*

" 23. Side view of the shell as preserved; the broken shell portions on the left are nacreous.
" 24. The spire seen from above.
Dulkaninia Bore. Collection Brown.

CINULIA HOCHSTETTERI, *Moore, sp.*

" 25. An imperfect example, showing the body whorl, the penultimate, and portion of the antipenultimate whorls— × 2. Lake Eyre Basin. Collection Tate.

ANCHURA WILKINSONI, *Eth. fil.*

" 26. Imperfect shell. An internal cast exhibiting the moniliform carina of the penultimate, and continuous chief carina on the body whorl.
" 27. Another example, with a portion of the wing.
" 28. A natural section of the whorls.
" 29. A further example, seen partly as an internal cast, partly testaceous, and partly in natural section.
" 30. Testaceous remains of the wing.
Lake Eyre Basin. Collection Tate.

DENTALIUM WOLLUMBILLAENSIS, *Eth. fil.*

" 31. Portion of a shell— × 2. Lake Eyre Basin. Collection Tate.

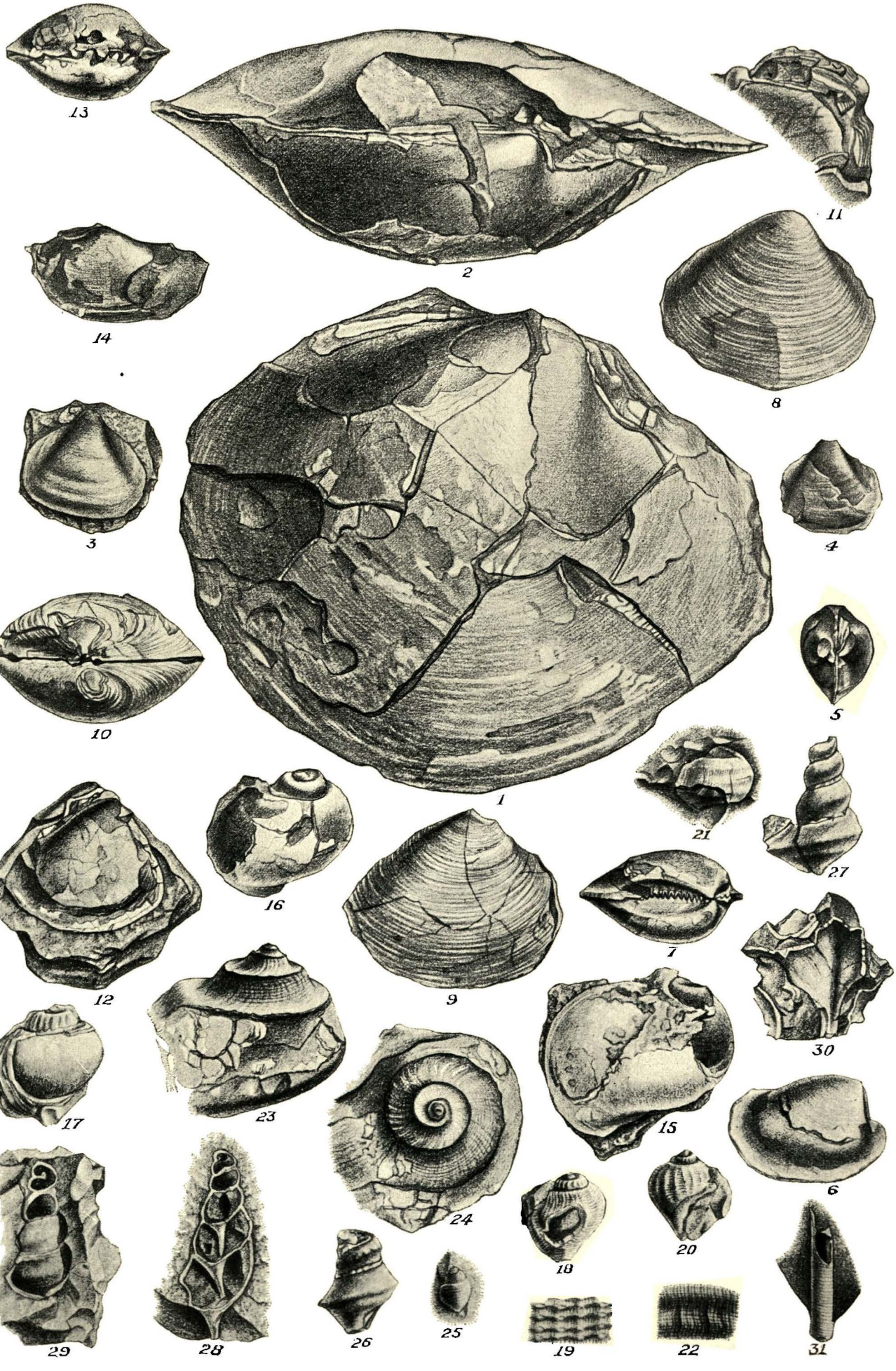
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PLATE VII.

HAPLOCERAS DAINTREEI, *Etheridge, sp.*

Fig. 1. Portion of a whorl of an aged specimen; the lightly-tinted portions are nacreous. Dulkaninia Bore. Collection Brown.

DESMOCERAS CAROLENSIS, *Eth. fil.*

" 2. Remains of several whorls, exhibiting the constricting sulci and septa; and cameræ on the outer whorl —× 2.

" 3. A small individual with sulci.

" 4. Another specimen showing sulci and sutures; the latter are too ill preserved to be correctly rendered —× 2.

" 5. Venter of another example with sutures—× 2.

Point Charles. Collection Austr. Mus.

HISTRICHOCERAS (?) ANTIPODEUS, *Eth. fil.*

" 6. Portion of a shell exhibiting the halves of three whorls, the costæ on the flattened flanks, and tubercles along the abdominal angles—× 1½.

" 7. The venter, showing keel, and tubercles along the abdominal angles—× 1½.

Point Charles. Collection Austr. Mus.

AMALTHEUS, *sp. ind.*

" 8. Impression, with testaceous traces, of half a small ammonite near *Amaltheus olene*, Ten. Woods, or *A. walshensis*, Eth. fil. Lake Eyre Basin. Collection Tate.

BUCHICERAS (?) *sp. ind.*

" 9. Minute Ammonite (half) with ceratitiform sutures, probably allied to *Buchiceras* or *Tissotia*—× 2. Lake Eyre Basin. Collection Tate.

SCAPHITES ERUCIFORMIS. *Eth. fil.*

" 10. Side view, showing unrolled portion of shell, umbilicus, and crozier—× 2.

" 11. Front view of the coil—× 2.

Point Charles. Collection Austr. Mus.

HAMITES (?), *sp. ind.*

" 12. Lateral view of a fragment, with thick, simple, single costæ—× 1½.

" 13. View of the venter—× 1½.

Point Charles. Collection Austr. Mus.

ANCYLOCERAS (?), *sp. ind.*

" 14. Lateral view of a fragment, near the proximal coil, with oblique costæ and a row of obscure tubercles along the margin of the venter—× 1½

" 15. View of the venter—× 1½.

Point Charles. Collection Austr. Mus.

BELEMNITES SELHEIMI, *Ten. Woods.*

" 16. Portion of a phragmacone referred to this supposed species.

" 17. Apical section of fig. 16, with siphuncle.

Lake Eyre Basin. Collection Tate.

BELEMNITES EREMOS, *Tate.*

" 18. Guard with a dorso-lateral furrow and a portion of the phragmacone.

" 19. Guard—Section of fig. 21, showing a portion of the alveolus and axial canal.

" 20. Guard—Dorso-lateral view of fig. 21.

" 21. Guard—Ventro-lateral view of figs. 19 and 20.

Stuart's Creek. Collection Tate.

AUCELLA INCURVA, *Eth. fil.*

" 22. Right and left valves, with incurved umbo of the latter—average natural size.

" 23. Left valve of fig. 22—× 2.

" 24. Fig. 22 enlarged—× 2.

" 25. Left valve of another specimen with concentric sculpture.—× 2.

" 26. Left valve of a broader specimen—× 2.

" 27. Right and left valves of fig. 26—× 2.

Point Charles. Collection Austr. Mus.


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