

GEOLOGICAL SURVEY OF CANADA

GEORGE M. DAWSON, C.M.G., LL.D., F.R.S., Deputy Head and Director

MESOZOIC FOSSILS

VOLUME I.

PART IV.—On some additional or imperfectly understood fossils from the Cretaceous rocks of the Queen Charlotte Islands, with a revised list of the species from these rocks

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J. F. WHITEAVES, LL.D., F.G.S., F.R.S.C., Etc.

PALEONTOLOGIST, ZOOLOGIST, AND ASSISTANT DIRECTOR



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY

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The present or fourth part of the first volume of "Mesozoic Fossils" is essentially an illustrated report on two collections of fossils from the Cretaceous rocks of the Queen Charlotte Islands, made by Dr. C. F. Newcombe, of Victoria, B.C., in 1895 and 1897. In addition to this, it contains a revision of the nomenclature of some of the fossils previously collected from these rocks by Mr. James Richardson in 1872 and by myself in 1878, and ends with a list of all the species that are now known to occur in them.

GEORGE M. DAWSON.

GEOLOGICAL SURVEY OFFICE,

OTTAWA, November 8, 1900.

MESOZOIC FOSSILS.

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IV. On some additional or imperfectly understood fossils from the Cretaceous rocks of the Queen Charlotte Islands, with a revised list of the species from these rocks.

PREFATORY REMARKS.

In 1895 and 1897, extensive collections of fossils from the "Lower Shales", or "Division C", of the coal-bearing rocks of the Cretaceous system, at Skidegate and Cumshewa inlets, were made by Dr. C. F. Newcombe, of Victoria, V.I. A full series of the choicest specimens in these collections has been lent to the writer for study and comparison, and some of the best of them have been generously presented by Dr. Newcombe to the Museum of the Survey. Those which the writer has seen add eight new species of marine invertebrata (viz., three of ammonitidæ, four of pelecypoda, and one of brachiopoda) which are described and figured in this paper, to the fauna of the Lower Shales, besides some interesting fossil plants, which have yet to be studied. Some of the fossils collected by Dr. Newcombe, also, are much better specimens than had previously been obtained of species that had already been described. Thus, one particularly fine specimen (which has been presented to the Museum) shows that the fragments upon which *Spiroceras Carlottense* was based (in the third part of this volume) are portions of a large *Turritiles*; and others that *Acanthoceras spiniferum* is probably distinct from *A. Stolickanum* (Gabb).

The revised list of species at the end of this paper shows that eighty-nine species of marine invertebrata are now known from the Lower Shales besides five that are too imperfect to be determined specifically. Of the

former one is a coral, three are brachiopods, one is a crustacean, and the rest are mollusca proper. The cephalopoda are much more numerous, both in species and in individuals, than the gasteropoda, and the ammonitidæ are specially abundant. The latter would seem to be remarkable for the presence of several species of *Desmoceras* (inclusive of *Puzosia*), and for the absence of *Baculites*, and of the numerous species of *Pachydiscus* which are so characteristic of the Vancouver Cretaceous. The number of species of pelecypoda appears to be much larger, even, than that of the cephalopoda. No new information has been obtained about the fossils of Subdivisions A, B, D, or E, of Dr. G. M. Dawson's section.

The progress of palæontological research during the fourteen years that have elapsed since the third part of this volume was written, has necessitated some alterations in the nomenclature of the genera and species described or identified therein. Thus, on page 205 of that part, an Ammonite which is very abundant at Cumsheewa Inlet was identified with the *Ammonites Beudanti* of d'Orbigny and Stoliczka,—and placed in the genus *Haploceras* on the authority of Dr. Neumayr, in his paper "Ueber Kreideammonitiden" in the Transactions of the Royal Academy of Sciences of Vienna for 1875. Since then, however, Zittel has placed *A. Beudanti* in his genus *Desmoceras*, and still more recently, Dr. Franz Kossmat (who refers it to *Puzosia*, which he regards as a subgenus of *Desmoceras*) claims that several species have been confounded under the name *Ammonites Beudanti*, and that the Cumsheewa specimens are not exactly like any of them.. It has therefore seemed most prudent to distinguish the Cumsheewa *Desmoceras* (or *Puzosia*) by a different specific name.

On page 234 of the same part, specimens of an *Arca*-like shell from Maud Island are designated "*Nemodon Fischeri*, d'Orbigny, (Sp.)". Their hinge dentition was supposed to be like that of Conrad's genus *Nemodon*, and their specific identification was based partly on their great similarity to d'Orbigny's figures of *Arca concinna* (a name that was found to be preoccupied and changed to *A. Fischeri*); and partly on the fact that Eichwald held that the beds holding *Arca Fischeri* and *Aucella Mosquensis* are of Neocomian rather than of Jurassic age. In the most recent Russian geological publications, however, these beds are regarded as "Oxfordien", and the identification of the Maud Island *Arca* with a Russian Jurassic species would seem to be no longer tenable.

Among the Ammonites from the "Lower Shales", collected by Mr. Richardson in 1872, there are a few species that seemed to have such a Jurassic aspect, that three of them were referred to the Jurassic genus *Stephanoceras*, and two to *Perisphinctes*, which is almost exclusively Jurassic. But, in the present state of our knowledge of the Cretaceous Ammonitidæ, these resemblances would seem to be more apparent than

real. At any rate, Dr. Kossmat (on page 27 (134) of the second part of his monograph of the Cretaceous Cephalopoda of Southern India) has expressed the opinion that *Ammonites Richardsoni* (nobis) is an *Olcostephanus* rather than a *Stephanoceras*. Numerous specimens collected by Dr. Newcombe show that "*Stephanoceras cepoides*" (and probably *S. cblatum*) is an *Olcostephanus*, with much the appearance of a Scaphite. Dr. Kossmat, too, in a letter to the writer, says that he thinks that *Ammonites Skidegatensis* and *A. Carlottensis* (which the writer had referred to *Perisphinctes*) may possibly be referable to *Olcostephanus*, and perhaps most nearly related to a Mexican Cretaceous species (*O. Zirkeli*) recently described by Felix and Lenk.*

In the present paper, also, it has been thought desirable to distinguish by different, and for the most part new, specific names, a few fossils from the Lower Shales that have previously been identified with the following Jurassic species from the western United States.†

<i>Belemnites densus</i> , Meek & Hayden.	<i>Modiola subimbricata</i> , Meek.
<i>Pleuromya subcompressa</i> , Meek.	<i>Oxytoma mucronata</i> , Meek.
<i>Grammatodon inornatus</i> , Meek & Hayden.	<i>Gryphæa Nebrascensis</i> , Meek & Hayden.

It has long been obvious that the Lower Shales represent a well-defined horizon in the earlier Cretaceous of the Pacific coast of North America, and it now seems scarcely probable that any of the fossils therefrom can be identical with any of these species. In any case, Dr. Stanton states that the name *Pteria* (or *Oxytoma*) *mucronata*, Meek, is preoccupied; and additional specimens of the *Modiola* from Maud Island, collected by Dr. Newcombe in 1895, show that it is probably distinct from *M. subimbricata*.

Plate 33, which refers exclusively to specimens described or referred to on pages 246-252 of Part III, and which should have accompanied it, is issued herewith.

In conclusion, the writer desires to express his thanks to the following gentlemen for assistance rendered during the preparation of this paper. To Dr. C. F. Newcombe, and to Mr. John Fannin, Curator of the Provincial Museum at Victoria, for the loan of many interesting specimens. To Professor H. Pilsbry, for the loan (for comparison) of the types of *Pleuromya papyracea*, *Meekia sella*, and *Cucullæa truncata*, Gabb, from the Museum of the Academy of Natural Science of Philadel-

*Beiträge zur Geologie und Palæontologie der Republik Mexico, theil 3, p. 182, pl. 29.

†The specimens referred to *Astarte Packardi*, on page 229 of this volume, have since been described as *A. Carlottensis*, on page 154, of volume 1, pt. 2, of "Contributions to Canadian Palæontology," published in 1889.

phia. To Dr. T. W. Stanton, for the opportunity of examining Californian specimens of the three species of *Meekia* described by Gabb. To Professor J. C. Merriam, for kindly comparing four specimens from Skidegate Inlet with the types of *Terebratella obesa*, Gabb, in the Museum of the University of California, at Berkeley; and to Dr. Franz Kossmat, for critical suggestions in reference to *Acanthoceras spiniferum*.

NOTES ON THE SPECIES FROM THE LOWER SHALES, WITH DESCRIPTIONS OF
A FEW THAT APPEAR TO BE NEW.

FISHES.

TELEOSTEI.

The only remains of fishes from the Cretaceous rocks of the Queen Charlotte Islands that the writer has seen are a few well-preserved but imperfect scales, collected at South Island, in Skidegate Inlet, by Dr. G. M. Dawson, in 1878. The largest of these are about ten or eleven millimetres in their maximum diameter. They are very thin, cycloidal, rather variable in outline, but mostly subquadrate, with an eccentric nucleus. Their sculpture consists of extremely minute and densely crowded concentric raised lines, and of larger and more distant radiating ones inclosed in a triangular area.

CRUSTACEA.

DECAPODA.

"Genus *HOMOLOPSIS*, Bell.

"Carapace longer than broad, quadrilateral; regions of carapace very distant; branchial region large, triangular; orbits close together, frontal region rather produced; front subrotund." Woodward.

HOMOLOPSIS RICHARDSONI, Woodward.

Homolopsis Richardsoni, Woodward. 1896. Quart. Journ. Geol. Soc. Lond., vol. LII., p. 224, fig. 3.

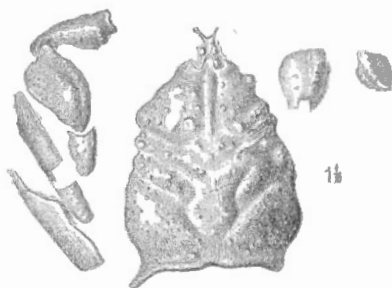


Fig. 13. *Homolopsis Richardsoni*. From a cliché of the original block, kindly supplied by Dr. Woodward.

"This interesting little crab was obtained by Mr. James Richardson in 1872 from Skidegate Inlet, west of Alliford Bay, Queen Charlotte Islands, and is preserved in a hard black limestone-nodule containing plant-remains. Portions of the limbs still remain in their normal position, showing that it was entire when originally buried in the matrix.

"Length of carapace 20 millim., greatest breadth 17 millim. ; breadth of posterior border 14 millim.; breadth across hepatic region 14 millim.

"The carapace is broadly quadrilateral, but pointed in front; the branchial regions extend to fully one half the length of the carapace; they are roughly triangular in shape, and nearly meet on the middle line behind the cardiac region; cardiac region small, shield-shaped but elevated; metagastric region marked by two small prominences; hepatic regions prominent. Two very distinct and almost parallel furrows, the branchial furrow and cervical or hepatic furrow, diverge from the sides of the cardiac and metagastric regions obliquely forward towards the lateral margins of the carapace. Two deep submedian furrows mark the frontal portion of the cephalothorax; reaching to the rostrum, where they converge on the central line. Two small spines (or other appendages) project (as in the genus *Latreillia*) from the rostrum on either side.

"The hinder border is extremely wide and straight, and suggests the broad margin for the attachment of the tail as in the females of all the *Anomala*, in which section the abdomen is only partially concealed beneath the cephalothorax.

"The surface of the carapace, which is tumid, is coarsely and irregularly covered with small rounded tubercles, which are larger on the gastric and hepatic regions.

"The walking legs were evidently long and fairly large, and the chelipeds covered and tuberculated as in *Homola*.

"This species has many points of resemblance to Reuss's *Prosopon verrucosum*, from which, however, it differs in the greater anterior breadth of Reuss's specimen, and in the form of the rostrum and arrangement of the furrows upon the gastric and cardiac regions. Reuss's *P. verrucosum* should probably be placed in Bell's genus *Homolopsis*.

"In *Homolopsis Edwardsii*, Bell, from the Gault of Folkestone, the frontal border is broader and the carapace more quadrate than in the North American form, which is pointed in front; the anterior half of the carapace in *H. Edwardsii* is more coarsely ornamented with fewer and larger tubercles, and the arrangement of the lobes differs considerably from that in *H. Richardsoni*.

"I would refer this specimen to *Homolopsis*, and dedicate this species to the discoverer, Mr. James Richardson.

"The specimen is from the Museum of the Geological Survey of Canada, Ottawa."—Woodward.

With the exception of *Unio Hubbardi*, and possibly of some of the plants, all the fossils from the "Lower Shales" in Skidegate Inlet, collected by Mr. Richardson, are labelled "west of Alliford Bay." The writer was informed by Mr. Richardson that all the specimens thus labelled are from Maud Island, or Lina Island, but mostly from the former.

MOLLUSCA.

CEPHALOPODA.

(DIBRANCHIATA.)

PHYLLOTEUTHIS INCERTUS. (Nom. prov.)

Plate 35, fig. 1.

Expanded part of the gladius of the only specimen known to the writer resembling that of the type of *P. subovata* of Meek and Hayden, as described and figured by Meek,* in some particulars, but differing apparently therefrom in its larger size, much greater proportionate breadth anteriorly, and broader midrib. Oblique striæ of the alation much as in *P. subovata*. Shaft unknown.

East end of Maud Island, Dr. G. M. Dawson, 1878 : an impression of the greater part of the expanded portion of the gladius, which, however, is very imperfect at both ends and nowhere shows the exact marginal outline. Its actual dimensions are, length about forty-five millimetres, breadth about thirty-four, whereas in Meek's type of *P. subovata*, which shows a considerable portion of the marginal outline, the length of the organism, apart from the restoration, is thirty-nine mm., and the greatest breadth only twenty-one and a half.

BELEMNITES ASSIMILIS. (N. Sp.)

Belemnites, (Sp. undt.) Whiteaves. 1876. This volume, pt. 1, p. 11, fig. 1, and pl. 1. figs. 1, 1, a-c.

Belemnites densus, Whiteaves. 1884. Ibid., pt. 3, p. 194, pl. 22, fig. 1. But possibly not *B. densus*, Meek and Hayden (1858); which is said to be a Jurassic species.

Skidegate Channel, west of Alliford Bay, J. Richardson, 1872; and coal locality, south side of Skidegate Inlet, Dr. G. M. Dawson, 1878; the specimens referred to on pages 11 and 194 of previous parts of this volume.

*Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri Country, p. 505, pl. 33, fig. 3.

BELEMNITES SKIDEGATENSIS.

Belemnites Skidegatus, Whiteaves. 1884. This volume, pt. 3, p. 195, pl. 22, figs. 2 and 2, a-c.

An unusually good specimen of the guard of this species was collected on the south side of Alliford Bay, in Skidegate Inlet, by Dr. Newcombe in September, 1895.

(TETRABRANCHIATA.)

NAUTILOIDEA.

NAUTILUS (CYMATOCERAS) CARLOTTENSIS. (N. Sp.)

Nautilus (Sp. undt.) Whiteaves. 1876. This volume, pt. 1, p. 14.

Nautilus Suciensis, Whiteaves. 1884. Ibid., pp. 33, 197 and 198, pl. 21. But perhaps not *N. Suciensis*, Whiteaves, 1879; *ibid.*, pt. II, p. 97, pl. 11, figs. 1 and 1 a.

Maple Island, Skidegate Inlet, C. F. Newcombe, 1895: a cast of the body chamber some seven inches in length, by about four inches and a half in its maximum breadth, with a faint longitudinal depression or shallow groove in the middle of the venter.

The identification of the large ribbed *Nautilus* from the Lower Shales at Skidegate Inlet with the *N. Suciensis* of the Nanaimo group of the Sucia Islands has not proved quite satisfactory, and it is now thought desirable to distinguish the former provisionally by a different specific name.

AMMONOIDEA.

PHYLLOCERAS KNOXVILLENSE. Var.

Cfr. *Phylloceras Knoxvillensis*, Stanton. 1896*.—Bull. U. S. Geol. Surv., No. 133, p. 72, pl. 14, figs. 1-4.

Shell essentially similar to *P. Knoxvillense*, in shape, surface markings and septation, and differing therefrom only in the entire absence of any "well marked periodic constrictions."

East end of Maud island, C. F. Newcombe, 1895: two specimens, the larger (which has been presented to the Museum) 102 mm., or about four inches, in its maximum diameter; the smaller 67 mm., or nearly two inches and three-quarters. These specimens are intermediate in their characters between the typical form of *P. Knoxvillense* and *P. ramosum*, Meek, which latter shell is regarded by Dr. Kossmat as identi-

* Although the date on the cover and title pages is 1895, the words "Issued Feb. 3, 1896" are written on the outside of a copy sent to the writer by Dr. Stanton.

cal with *P. Nera*, the *Ammonites Nera* of Forbes. The smaller one differs from *P. ramosum* only in having slightly coarser ribs.

Cumshewa Inlet, C. F. Newcombe, 1897: two very imperfect specimens, which may be referable to this species, but which seem to have a rather wider umbilicus in proportion to the size of the shell.

LYTOCERAS BATESI, Trask. (Sp.)

- Ammonites Batesi*, Trask. —1855. Proc. Calif. Acad. Sc., vol. I, p. 40.
 " " Gabb. —1864. Geol. Surv. Calif., Palæont., vol. I, p. 67,
 pl. 13, figs. 16 and 16, *a-b*.
 " " Gabb. —1869. Ibid., vol. II, p. 132, pl. 20, fig. 9 *a*, and
 pl. 21, figs. 10, *a-b*.
Ammonites crenocostatus, Whiteaves. —1876. This volume, pt. 1, p. 45, pl. 9, figs. 2 and
 2 *a*.
Lytoceras Batesi, Whiteaves. —1884. Ibid., pt. 3, p. 202, pl. 27, fig. 1.
 " " Stanton. —1896. Bull. U.S. Geol. Surv., No. 133, p. 75, pl.
 13, figs. 9-11.

East end of Maud Island, Dr. C. F. Newcombe, September, 1895: three small specimens. Lina Island, Skidegate Inlet, Dr. Newcombe, 1897: a specimen (now in the Museum of the Survey) about two inches and three-quarters in its maximum diameter. According to Dr. Kossmat, (Mittheil. Paläont. Inst. Univ. Wien, Band IX, p. 113) this species is a typical *Lytoceras* and belongs to the group of *L. fimbriatum* (Sowerby.)

LYTOCERAS (GAUDRYCERAS) SACYA, Forbes (Sp.)

- Ammonites Sacya*, Forbes. 1846. Trans. Geol. Soc. London, Ser. 2, vol. VII, p. 113,
 pl. 14, fig. 10.
Ammonites Buddha, Forbes. 1846. Ibid., vol. VII, p. 112, pl. 14, fig. 9.
Ammonites Sacya, Stoliczka. 1865. Palæontologia Indica, Cret. Fauna S. India, p.
 154, pl. 75, figs. 5-7; and pl. 76, figs. 2 and 3.
Ammonites Sacya, var. *Sachalinensis* (in part). Fr. Schmidt. 1873. Kreidepetrefacten
 von Sachalin (Mém. Acad. St. Petersbourg, VII Ser., Tome XIX,
 No. 3) p. 15, pl. 2, figs. 3 and 4.
Ammonites filicinotus, Whiteaves. 1876. This volume, pt. 1, p. 43, pl. 2, figs. 2, 2 *a-c*,
 and 3.
Lytoceras Sacya, Whiteaves. 1884. Ibid., pt. 3, p. 203, pl. 25.
 " " M. Yokoyama. 1889. Versteinerungen aus der Japanischen
 Kreide (Palæontographica, vol. xxxvi) p. 178, pl. 18, figs.
 12 and 13.
 " " K. Jimbo. 1894. Fauna der Kreide von Hokkaido (Palæontol
 Abhandlungen, vol. VI, pt. 3) p. 34 (180), pl. 6 (22), fig. 1.
 " " Stanton. 1894. Stanton and Diller. The Shasta-Chico Series
 Bull. Geol. Soc. America, vol. V, p. 445.
Lytoceras (Gaudryceras) Sacya. Kossmat. 1895. Untersuchungen über die Südindische
 Kreideformation, (Mittheil. Paläontolog. Institut. Uni-
 versität Wien, Band IX,) p. 119.

Maple Island, Skidegate Inlet, Dr. Newcombe, 1895: a distorted specimen, about five inches and a half in its greatest diameter. Cumshewa Inlet, Dr. Newcombe, 1895: one rather worn specimen. As *Ammonites Buddha* was first described by Forbes on page 112, and *A. Sacya* on page 113 of the same volume of Transactions of the Geological Society of London, it seems to the writer that the former of these two specific names should have been retained for this species.

LYTOCERAS (TETRAGONITES) TIMOTHEANUM, Mayor. (Sp.)

- Ammonites Timotheanus*, Mayor. 1847. Pictet and Roux, Mollusques des Grés Verts, p. 39, pl. 2, fig. 6; and pl. 3, figs. 1 and 2.
 " " Stoliczka. 1865. Palæontologia Indica, Cret. Cephal. S. India, p. 146, pl. 73, figs. 3-6.
 " " Fr. Schmidt. 1873. Petref. der Kreide von Sachalin, p. 14, pl. 2, figs. 7-11.
 " " Whiteaves. 1876. This volume, pt. 1, p. 41, pl. 3, figs. 2 and 2a.
Lytoceeras Timotheanum, Whiteaves. 1884. Ibid., pt. 3, p. 203.
Lytoceeras (Tetragonites) Timotheanum, Kossmat. 1895. Untersuchungen Südindische Kreideformation, p. 133, pl. 17 (3), figs. 11, and 13, a-b.

East end of Maud Island, Dr. Newcombe, 1895: one specimen. An imperfect but well preserved and characteristic specimen in the Museum of the Survey, which is clearly referable to this species, was collected in the Cretaceous rocks at Comox, Vancouver Island, by Mr. Walter Harvey in 1891.

TURRILITES CARLOTTENSIS, Whiteaves.

Plate 34 (the only figure).

Spiroceras Carlottense, Whiteaves. 1884. This volume, pt. 3, p. 198.

Amended description.—Shell large, narrowly elongated, usually sinistral, but apparently sometimes dextral: volutions widely separate longitudinally, slightly compressed on the venter and dorsum, broadly subovate or almost circular in transverse section, and coiled obliquely in such a way as to leave a rather wide empty space, of the nature of an umbilical perforation, in the middle of each. Surface markings consisting of small, close-set, low, transverse ribs, and of comparatively distant spines or tubercles. Sutural line not clearly shown in any of the specimens that the writer has seen, but the siphuncle forms the median line of the venter.

The smallest but much the most perfect of the three specimens of *Spiroceras Carlottense* from Cumshewa Inlet, described in the third part of this volume, must be regarded as the type of that species. It shows that the ribbing is rather faint, and that there are three spinous tuber-

cles in each transverse row, on the lower half of one of the early volutions, and apparently below the siphuncle. In the large specimen figured, which was recently collected by Dr. Newcombe, and is believed to be referable to this species, the ribs are small, rounded and closely disposed. The tubercles are badly preserved and obscurely indicated, but they appear to have been both large and distant. In each transverse row there are indications of four tubercles, three below the siphuncle and one above.

Skidegate Inlet, at Bearskin Bay, (the fine specimen figured, which is upwards of eight inches in length, and more than four inches in its maximum breadth,—and two fragments); and at Maple Island, a specimen consisting of one nearly complete volution. North side of Cumshewa Inlet, two fragments. All of these specimens were collected in September, 1895, by Dr. Newcombe, who has kindly presented the one figured to the Museum of the Survey.

As now understood, this species would seem to be a true *Turrilites*, rather than a *Spiroceras* or *Helicoceras*, although its volutions are far from being closely contiguous.

TURRILITES. (Species uncertain.)

A worn specimen, consisting of rather more than two volutions, collected at Skidegate Inlet, by Dr. Newcombe, in 1897, though too badly preserved to admit of accurate identification or description, is yet clearly distinct from *T. Carlottense*. It differs therefrom very obviously in its closely and compactly coiled volutions, imperforate axis, and very coarse transverse ribs. The specimen is now in the Museum of the Survey.

DIPTYCHOCERAS.

A specimen of nearly the whole of the outer limb of a species of *Diptychoceras*, that seems to differ from the *D. laevis* of Gabb in being marked by low, rounded, transverse and straight annulations, was collected at Cumshewa Inlet by Dr. Newcombe in 1895. The specimen is a little more than two inches and a half in length, nearly circular in section and about twelve millimetres, or not quite half an inch, in its dorso-ventral diameter, at or near the anterior end. Its sutural line is very similar to that of *D. laevis*.

SCHLOENBACHIA INFLATA, Sowerby. (Sp.)

- Ammonites inflatus* (Sowerby.) —Stoliczka. 1865. Cret. Ceph. S. India, vol. 1, p. 48, (which see for a list of the synonyms of European specimens), pls. 27, 28, 29; and 30, figs. 1-3.
- Schloenbachia inflata*, Whiteaves. —1884. This volume, pt. 3, p. 200.
- “ “ Szainocha. —1885. Zur Kenntniss einer mittelcretarischen Cephalopoden fauna den Inseln Elobi. (Denkschr. d. k. Akad. d. Wissensch. Wien, Mat. nat. Cl. 1885, Bd. XLIX) p. 232, pl. 2, figs. 1-3.
- “ “ Choffat. —Matériaux pour l'étude stratigraphique et paléontologique de la province d'Angola, (Mem. Soc. de Physique et d'Histoire Naturelle de Genève, vol. xxx, pt. 1, No. 2.) p. 62.
- “ “ var. Jack & Etheridge. —1892. Geol. and Palæont. of Queensland and New Guinea, London, p. 409.
- “ “ Diller and Stanton. —1894. Bul. Geol. Soc. Amer., vol. v, p. 445.
- “ “ Kossmat. —1895. Untersuch. über die Südindische Kreideformation, pt. 1, p. 185, pl. 23 (9) a-c, and 2; and pl. 24 (10), fig. 1.

East end of Maud Island, Dr. Newcombe, 1895: a large but imperfect specimen, about eight inches in its maximum diameter.

ACANTHOCERAS SPINIFERUM. (Nom. mut.)

Plate 35, figs. 2, and 3, 3 a.

Ammonites Stoliczkanus, var. *spiniferus*, Whiteaves. 1876. This volume, pt. 1, p. 24, fig. 2; pl. 3, fig. 3; and pl. 4, fig. 1.

In 1895, Dr. Newcombe collected several specimens of this species at the east end of Maud Island, and among them a particularly fine specimen, that is about eight inches in its maximum diameter and five inches in breadth. This fine fossil, which has been acquired for the Survey collection, gives a much better idea of the characters of the adult stage of *A. spiniferus* than the imperfect and distorted original of figure 1, on plate four of this volume, which was the largest specimen then known. The former may be briefly described as follows: Shell large, strongly inflated but deeply and rather widely umbilicated, the umbilicus occupying a little more than one-third of the total diameter. Volutions probably about five, though only the three outer ones are seen in this specimen, increasing rather rapidly in size, the outer one rounded, but a little broader laterally than in a ventro-dorsal direction, truncated on the umbilical side and overlapping about one-half of the previous one. Umbilicus steep-sided, with a rounded margin; shape of the outer lip unknown.

Surface marked by transverse, tuberculated ribs, which are usually simple but occasionally bifurcate. One comparatively large and long rib usually alternates with two smaller and shorter ribs, and each rib bears six small, distant tubercles on each side of the siphuncle. Septum, much as in *Acanthoceras mamillare* (Schlotheim).

An unusually perfect but very small specimen collected by Dr. Newcombe, a little over an inch in its maximum diameter, the original of figs. 3 and 3 a on Plate 35, has four tubercles on each rib, on each side of the siphuncle, arranged as follows: one small tubercle on the umbilical margin, one half-way across the side, and two tubercles close together, just outside of the siphuncle.



Fig. 14. *Acanthoceras spiniferum*. Outline of transverse section of a small specimen, to show the relative position of the two sets of tubercles on each side.

The following notes on the specific relations of *A. spiniferum* have been kindly communicated by Dr. Franz Kossmat, of the University of Vienna, to whom one of the medium-sized specimens collected by Dr. Newcombe was sent in March, 1896, for comparison with *A. laticlavium*, Sharpe, var. *Indicum*, Kossmat.

"*Acanthoceras Stoliczkanum*, var. *spiniferum*, Whiteaves.

"I have been quite surprised by the close resemblance of this species to our European *Acanthoceras mamillare* (Schlotheim), one of the most common fossils of the European Gault (Albien), known also in the Cretaceous deposits on the western coast of Africa. The specimen you have so kindly sent me is characterized by a very peculiar ornamentation, consisting of two sets of tubercles on each side.

"Each of these sets is composed of three tubercles, which are spirally elongated and sharpened in set 1, and rounded in set 2. The two sets of tubercles are separated from each other by a greater distance than the interstices between the tubercles in either set. On *A. mamillare* also, in middle stages of growth, there are two sets of tubercles on each side of the siphuncle, which arise from two tubercles only (in youth stage) by successive division, the same as you observed in *A. spiniferum*. The inner tubercles on the inner whorls are often somewhat spinous (Comp. P.

Choffat : Matériaux pour l'étude stratigraphique et paléontologique de la province d'Angola ; Mémoires de la société de physique et d'histoire naturelle de Genève, tome xxx, no. 2, 1888, pl. 3, fig. 1). Your specimen must be regarded as specifically distinct from *A. mamillare*, the siphonal interstice between the outer tubercles being broader, the number of tubercles in medium and comparatively large specimens smaller, etc., but it must certainly be considered as an American representative of the group of *A. mamillare*. You have already stated that it belongs to the *Mamillati*. Its general resemblance to *A. laticlavium* cannot be denied, but I think its relations to *A. mamillare* are even closer. *A. spiniferum* increases the number of Gault types in the Cretaceous series of the Queen Charlotte Islands, and strengthens your opinion that at least a part of the division C corresponds to the Gault."

On receipt of this communication, a photograph (natural size) of the large specimen collected by Dr. Newcombe was mailed to Dr. Kossmat who acknowledged its receipt in the following terms : "Please accept my thanks for the beautiful photograph that you have sent me. It is exceedingly interesting because it clearly shows that the adult form of the *Acanth. Stoliczkanum* var. *spiniferum* is quite different from its middle and younger stages. One of my friends, Mr. d'Anthula, who is engaged in a study of the Cretaceous rocks of the Caucasus, has detected in the Aptien strata (Lower Gault) of that region, a new species (not yet published), the general relations of which have been unsettled up to this time. Its septa remind one of *Acanth. Martinii* and *A. mamillare*, whilst its sculpture has much in common with some species of *Pachydiscus*. But, comparing specimens with your photograph, the resemblance of the type of sculpture in the adult stage (the young stage is not known in the Caucasus specimens), the section, etc., is so great that there can be no doubt that the two forms are allied and that both belong to the genus *Acanthoceras* and to the group of *A. mamillare*. Gabb's type of *Acanth. Stoliczkanum* is certainly related to the European *A. Martinii*, Orbigny, from the Lower Gault (Aptien), and I think that your *A. spiniferum* is distinct from both by its peculiar ornamentation, especially by the greater number of the tubercles in the same stages of growth, and by the compressed outer tubercles which are longitudinally elongated in the direction of the spiral, both characters which connect it well with the group of *A. mamillare*, as stated in a previous letter. To summarize all : I think that the group of *A. Martinii* is represented in California by *A. Stoliczkanum*, whereas *A. spiniferum*, Whiteaves, is related to the group of *A. mamillare*, and shows in adult age some peculiarities of sculpture that have not been known before, but that can be observed in an analogous

development on some Ammonites coming from the Aptien strata of the Caucasus."

It would therefore seem that *A. spiniferum* must be regarded as a distinct species and not as a variety of *A. Stoliczkanum*.

OLCOSTEPHANUS LOGANIANUS, Whiteaves.

Ammonites Loganianus, Whiteaves. —1876. This volume, pt. 1, p. 27, p. 28, fig. 3; and pl. 8, fig. 2.

Olcostephanus Loganianus, Whiteaves.—1884. Ibid. pt. 3, p. 211, pl. 23, figs. 1 and 1 a.

A few specimens of this species were collected by Dr. Newcombe, in 1895, on the south side of Alliford Bay. One of these, though a little worn, is in some respects the best specimen known to the writer.

OLCOSTEPHANUS CEPOIDES, Whiteaves.

Ammonites Loganianus, Whiteaves (?) Form B.—1876. This volume, pt. 1, p. 30, pl. 8, figs. 1 and 1 a.

Stephanoceras cepoides, Whiteaves. —1884. Ibid., pt. 3, p. 210.

A few specimens of a rather small, compressed and remarkably Scaphite-like form of this species, with an obliquely transverse constriction just behind the aperture, were collected by Dr. Newcombe at the east end of Maud Island in 1895, and on the south side of Alliford Bay in 1895 and 1897. A similar but much larger and more coarsely ribbed specimen, with a valve of an oyster over the umbilical cavity on one side, was collected by Dr. Newcombe at Maple Island in 1895. These specimens give the writer the impression that the species is probably an *Olcostephanus* rather than a *Stephanoceras*, but its septation is still unknown.

OLCOSTEPHANUS (ASTIERIA) DEANSII, Whiteaves.

Olcostephanus (Astieria) Deansii, Whiteaves.—1893. Canad. Record of Science, p. 442, pl. 7, figs. 1 and 1 a.

Skidegate Inlet, James Deans: the specimen described and figured in the above mentioned publication,—which is the only one that the writer has seen.

The original description is as follows:—"Shell small, compressed at the sides and narrowly rounded at the periphery: umbilicus occupying rather less than one-third of the entire diameter. Volutions three or four, increasing rapidly in size, especially in the dorso-lateral direction, and rather closely embracing, about two-thirds of the sides of the inner ones being covered, the outer one a little higher than broad;

aperture elliptical in outline but deeply emarginate by the encroachment of the preceding volution.

"Surface marked by numerous, closely arranged, small but distinct, though not very prominent, flexuous, transverse ribs, which bifurcate about the middle of the sides and then pass uninterruptedly over the periphery.

"The sutural lines are so crowded together and confused that, although fairly well preserved in places, it is scarcely possible to follow the details of any single one. The siphonal saddle, however, is small, a little higher than broad, with a minutely trifurcate apex, and an appressed spur on each side below. The first lateral saddle is large, ramose and unequally bipartite or obscurely tripartite at its summit. The siphonal lobe is large and symmetrical, with three branchlets on each side, two of which are lateral and one terminal, but the lowest of the two pairs of lateral branchlets is much the smallest of the three pairs.

"The only specimen collected is considerably eroded near the aperture, as represented in fig. 1, but in the uneroded portion the maximum diameter is about forty millimetres, and the greatest breadth fourteen.

"The writer has much pleasure in associating with this species the name of its discoverer, Mr. James Deans of Victoria, V. I., who accompanied Mr. James Richardson in his exploration of the Queen Charlotte Islands, in 1872, and who has since presented some unusually perfect specimens of the fossils of the Cretaceous rocks of those islands to the Museum of the Geological Survey Department at Ottawa.

"*O. Deansii* appears to belong to the small group of Ammonites of which *Olcostephanus Astieri* is the type, and for which M. Pavlow has recently (1891) proposed the generic or subgeneric name *Astieria*.* According to M. Pavlow, the *Olcostephani* of the group of *O. Astieri* form a natural group, a genus (*Astieria*) if one prefers to consider the *Olcostephani* as a family, or a subgenus if one would rather regard *Olcostephanus* as a genus.

"The shape and surface ornamentation of *O. Deansii* are very similar to those of *O. Jeannotti*. But in *O. Jeannotti* the ribs bifurcate at the umbilical margin, and are represented as so prominent as to everywhere break the general contour if the shell is viewed laterally. The siphonal saddles of *O. Jeannotti*, too, are described as broad, and the figures show that they are much broader than high. In *O. Deansii*, on the other hand, the ribs bifurcate half way across the sides, at a considerable distance from the umbilical margin, and are not sufficiently prominent to interrupt the continuity of the outline of the shell in a full side view.

*Bulletin Société Impériale des Naturalistes de Moscou, Année 1891, N. Ser., vol. v. p. 491.

The siphonal saddles of *O. Deansii*, also, are narrow, and, as already stated, a little higher than broad."

PERISPINCTES SKIDEGATENSIS, Whiteaves.

Ammonites (Perispinctes) Skidegatensis, Whiteaves.—1876. This volume, pt. 1, p. 34, fig. 4; pl. 7, and pl. 9, fig. 1.

Perispinctes Skidegatensis, Whiteaves.—1884. Ibid., pt. 3, p. 210.

A remarkably well preserved and nearly perfect specimen of *P. Skidegatensis*, from the Queen Charlotte Islands, and probably from the Lower Shales at Skidegate Inlet, was presented to the Museum of the Survey in 1893, by the Curator of the Provincial Museum at Victoria, B.C. It measures nearly eight inches in its maximum diameter, and shows the greater part of five volutions. A large fragment, consisting of a cast of the interior of the body chamber, about eight inches in length, of a specimen that is probably referable to *P. Skidegatensis*, was collected by Mr. Robertson, in 1896, at a locality between Yukon Lake and the head of Rennell Sound, and lent to the writer by Dr. Newcombe.

The septation of this shell is still unknown, and Dr. Kossmat, as already stated, thinks that it may prove to be an *Olcostephanus* of the type of the *O. Zirkeli* of Felix and Lenk*, from the Cretaceous rocks of Mexico.

HOLCODISCUS LAPEROUSIANUS.

Ammonites Laperousianus, Whiteaves.—1876. This volume, pt. 1, p. 39, pl. 3, fig. 3.

Holcodiscus Laperousianus, Kossmat.—1897. Untersuch. über die südindische Kreideformation, pt. 2, p. 34.

East end of Maud Island, Dr. Newcombe, 1895; a few specimens: north side of Maud Island, three specimens; and Lina Island, one specimen, Dr. Newcombe, 1897.

HOLCODISCUS CUMSHEWAENSIS.

Haploceras Cumshewaense, Whiteaves.—1884. This volume, pt. 3, p. 208, pl. 24, fig. 1.

Holcodiscus Cumshewaensis, Kossmat.—1897. Untersuch. über die südindische Kreideformation, pt. 2, p. 34.

This peculiarly sculptured Ammonite was described and figured from a fragmentary specimen collected on the north shore of Cumshewa Inlet by Dr. G. M. Dawson in 1878. Of late years five other specimens have been obtained at this locality. One of these is a small but comparatively perfect specimen, not quite two inches in its maximum diameter, collected

* Beiträge zur Geologie und Paläontologie der Republik Mexico, theil 3, (1891) p. 182, pl. 29.

by Mr. W. F. Ellis, at Cumsheewa Inlet, and lent to the writer by the Natural History Society of British Columbia. On the outer volution of this specimen there are eight or nine narrow and somewhat distant, flexuous constrictions, or narrow grooves, but there is a broad space near the aperture upon which these constrictions are obsolete. Between the constrictions there are about five narrow linear ribs, most of which bifurcate or doubly bifurcate at a short distance from the umbilical margin. The other four specimens were collected by Dr. Newcombe, at Cumsheewa Inlet, in 1895. One of these measures about four inches and a half in its maximum diameter and is the largest specimen that the writer has seen. On the interior half of its outer volution the periodic constrictions or arrest of growth are undeveloped or obsolete. The transverse ribs on the outer volution of this specimen too, are not thin and sharp, but comparatively broad, and flattened at their summits, on and near the periphery or venter, especially near the aperture. The sutural line of the species is still unknown.

HOPLITES HAIDAUQUENSIS.

Hoplites Haidaquensis, Whiteaves. —1893. Canad. Rec. Sc., vol. VI, p. 444, pl. 7, figs. 2, & 2, a-b.

"Shell small, strongly costate and widely umbilicated, the umbilicus, as measured from suture to suture, occupying about one-third of the entire diameter. Volutions about three, though the nucleus is not preserved in the only specimen collected, increasing rather rapidly in size and slightly embracing: the outer one moderately convex, a little broader than high, the outline of a transverse section being subpentagonal if made through one of the ribs, or not far from circular if in the centre of one of the grooves between them: aperture nearly circular but shallowly emarginate by the encroachment of the preceding volution.

"Surface marked by large and prominent, simple and nearly straight, transverse ribs, which are separated by rather broad concave grooves. The ribs, which are equal in length, are most elevated on the outer or peripheral portion of the last volution, and in the median line of the periphery there is a single angular notch on each rib which scarcely interrupts the continuity of the rib.

"Sutural line not clearly defined, but apparently not very complicated nor much branched. The first and second lateral saddles appear to be much broader than high, and doubly incised rather than ramose at the summits. The first lateral lobe seems to be trifurcate above and unusually small, though apparently much larger than any of the others except the siphonal lobe.

"Maximum diameter of the only specimen collected, twenty-nine millimetres: greatest breadth of the same, twelve mm.

"The specific name suggested for this little Ammonite is a modification of the word Hai-da-kwe-a, which Dr. G. M. Dawson quotes as the Indian name for the Queen Charlotte Islands, in his report on these islands, published in the Report of Progress of the Geological Survey of Canada for 1878-79.* The shell itself appears to belong to the sub-group *Dentatiregulares* of the *Dentati*, of Pictet's classification of the Ammonites in the "Paléontologie Suisse,"† and to that section of the genus *Hoplites* which Zittel calls the group of *Ammonites interruptus*.‡ In many of its characters it is very similar to *Hoplites sinuosus*, but it seems to have fewer and more distant ribs than that species and a different sutural line. Thus the type and only known specimen of *H. Haidaquensis* has twenty-two ribs on the outer volution, while that of *H. sinuosus*, which is almost exactly the same size, is said to have thirty-four. The sutural line of *H. Haidaquensis* seems to be more like that of *H. crassicosatus*, as figured by d'Orbigny,|| in which the first and second lateral saddles are represented as broader than high, whereas the corresponding saddles of *H. sinuosus* are represented as higher than broad." (Op. cit.)

HOPLITES YAKOUNENSIS. (N. Sp.)

Plate 36, figs. 1, 1 a and 1 b.

Shell small, compressed, rather narrowly umbilicated, periphery or venter narrow and subtruncated. Volutions so deeply embracing that the greater part of each of the inner ones is covered, the umbilicus occupying a little less than one-third of the entire diameter, the outer one flattened somewhat obliquely cutward from the margin of the umbilicus. Aperture narrowly elongated, much higher or longer than wide, subtruncate both above and below, widest and deeply emarginate below.

Surface of each side of the outer volution marked with a single row of about ten small, transversely elongated, conical tubercles on the umbilical margin, and with a corresponding row of from two to three times as many small, obliquely and slightly elongated tubercles on the outer margin of the periphery or venter. Across each of the sides these two sets of tubercles are connected by faint, obscure and almost obsolete, radiating and bifurcating costæ, but a few of the tubercles on the peripheral margin mark the termination exteriorly of short intercalated ribs that do not reach to the umbilical margin.

* Page 104b.

† Première par: .

‡ Handbuch der Paläontologie, vol. II, p. 476.

|| Paléontologie Française, Terrains Crétacés, tome 1, Atlas, pl. 59, fig. 3.

Sutural line not sufficiently well preserved to admit of an exact description of the whole or even of most of it.

East end of Maud Island, one imperfect specimen about forty millimetres, or a little more than an inch and a half, in its maximum diameter; and two miles south of Yakoun Lake, a similar but rather smaller specimen; both collected by Dr. Newcombe in 1895.

From its general resemblance to the *Ammonites denarius* of Sowerby, as figured by D'Orbigny, this small Ammonite would seem to belong to what Zittel calls the group of *A. interruptus*, Brug., and to be most nearly related to *Hoplites Vancouverensis* (the *Ammonites Vancouverensis* of Meek) and to *Pachydiscus Gollevillensis*, (D'Orbigny) as recently illustrated by Kossmat. *H. Vancouverensis*, however, is a much larger species, the shell of which, when adult, attains to a maximum diameter of nearly five inches. Its periphery or venter, too, is more flattened, and the tubercles which bound it on each side are elongated at almost a right angle to the ribs from which they proceed, so that each pair of tubercles is parallel, and not convergent forward, as those of *H. Yakounensis* are. *P. Gollevillensis*, has a proportionately wider umbilicus than that of the present species, and the tubercles on the outer margin of each side of the outer volution of the former are more nearly transverse to it.

HOPLITES NEWCOMBII. (N. Sp.)

Plate 37, figs. 1 and 1a.

Shell small, moderately convex but somewhat compressed laterally, and rather widely umbilicated. Volutions about five, the later ones lightly embracing, so that about one-half of the sides of the inner ones are exposed in the umbilicus. Outer volution a little broader than high, rounded subhexagonal in transverse section: umbilicus occupying about one-third of the entire diameter, though its margin is rounded and indistinctly defined.

Surface marked by very numerous, close-set, thin and sharp transverse ribs, most of which bifurcate from a minute flattened spinose tubercle, at a short distance from the umbilicus, pass over the venter and reunite at a corresponding tubercle on the opposite side. Between two of these longer and continuous ribs, a short and simple rib is frequently intercalated.

Sutural line unknown.

Maximum diameter of the only specimen known to the writer, thirty-six millimetres; breadth of the outer volution at the aperture, sixteen mm. and a half.

South side of Alliford Bay, Dr. Newcombe, 1895: a single well preserved specimen.

This delicately sculptured fossil is not at like any American species of Ammonite that the writer is acquainted with, and seems to be nearest to the *A. Gargasensis* of the French Neocomian, though perfectly distinct therefrom. The specific name proposed for the former is in honour of its discoverer, Dr. C. F. Newcombe, who has done so much to advance our knowledge of the geology, palæontology and ethnology of British Columbia, and who collected most of the specimens that are described or enumerated in this paper.

DESMOCERAS LATIDORSATUM, Michelin. (Sp.)

- Ammonites latidorsatus*, Michelin. 1838. Mém. Soc. Géol. France, vol. III, p. 101, pl. 12, fig. 9.
 " " D'Orbigny. 1840. Pal. Franc., Terr. Cret., vol. I, p. 270, pl. 80.
 " " Pictet and Roux. 1847. Foss. des Gres Verts, p. 44, pl. 3, figs. 4 and 5.
 " " Stoliczka. 1865. Cret. Cephalop. S. India, p. 148, pl. 74, figs. 1-4.
Ammonites inanis, Stoliczka. 1865. Ib., pl. 59, fig. 14.
Desmoceras latidorsatum, Kossmat. 1897. Untersuch. ü. die südindische Kreideformation, pt. 3, p. 107 (172), pl. 19 (25), figs. 2, *a-b*; 3, *a-b*; 4, *a-b*; and 5.

A few specimens, that agree very well with the descriptions and figures of this species, were collected by Dr. Newcombe in 1895 at Bear Skin Bay and at the east end of Maud Island. All of those that the writer has seen are mere casts of the shell, with the sutures of the septa either not preserved at all, or with their finer details almost obliterated by weathering. The largest and most perfect specimen is eighty-eight millimetres in its greatest diameter, and forty-three mm. in breadth or thickness near the aperture. It shows seven flexuous transverse constrictions on the outer volution, with tongue-like processes on the venter, but there are probably two or three more of these constrictions, as the posterior end of that volution is covered with the matrix. Between them, and parallel with them, there are remains of low, faint and close set costulæ. In another specimen the outline of a transverse section of the body chamber near the aperture is crescentic, the venter and sides being rounded and the dorsum broadly and deeply grooved for the reception of the previous volution.

The largest of the five specimens from South Island, and the two specimens from Bear Skin Bay, that were identified with *Lytoceras Timotheanum* on page 203 of the third part of this volume, are now believed to be referable to *Desmoceras latidorsatum*.

DESMOCERAS (PUZOSIA) PLANULATUM? Sowerby. Var.

Plate 36, fig. 2; and pl. 37, fig. 2.

- Haploceras planulatum*, Whiteaves. 1884. This volume, pt. 3, p. 207, pl. 28, fig. 1.

In the third part of this volume three imperfect and badly preserved Ammonites from Cumshewa Inlet were identified with the *Ammonites planulatus* of Sowerby, Sharpe and Stoliczka. The small one figured on Plate 28, has part of the test preserved, but so much of the periphery of the outer volution is worn away that its umbilicus appears to be wider proportionately than it really was. In this specimen both the venter and the sides are compressed, the transverse section being subquadrangular in outline, but higher or longer than broad, and concavely emarginate below. On the outer volution there are seven distant, slightly flexuous, transverse constrictions, which are flatly arched in crossing the venter. The ribs, which run parallel to them, are thin, sharp and separated by comparatively wide shallow grooves. The two large specimens referred to on page 207 are septate throughout and show the general shape fairly well, also the characters and relative proportions of the umbilicus. In the larger of the two the umbilicus appears to occupy a little more, and in the smaller a little less, than one-fourth of the entire diameter. The larger has all the surface markings obliterated by weathering, but the smaller is regularly ribbed and marked by seven or eight distant constrictions on the outer volution. The ribs are not very prominent, and narrower than the grooves between them.

Quite recently three specimens, which are apparently referable to this variety of *D. planulatum*, have been lent to the writer by Dr. Newcombe. One of these was collected at Cumshewa Inlet by Mr. Maynard Smith in 1892, and the other two at Maple Island by Dr. Newcombe in 1895. The Cumshewa specimen is a slightly distorted cast of the interior of most of the septate portion of the shell, with small portions of the test preserved. It measures about eleven inches in its maximum diameter, and about four inches in thickness. It is much more convex proportionately than the two large specimens from the same locality collected by Dr. Dawson. Owing to the distortion, the comparative size of the umbilicus of the specimen collected by Mr. Smith cannot be ascertained with much accuracy, but it can scarcely have occupied much more than one-fourth of the entire diameter. There are only five, distant and nearly straight, transverse constrictions, on its outer volution. The ribs, which though well marked, are low, rounded at their summits and narrower than the grooves between them, are usually simple, with an occasional shorter rib intercalated between two of the longer ones. The two specimens from Maple Island are both much compressed laterally. The more perfect of the two, the one figured, is a slightly crushed, septate cast about six inches and a half in its maximum diameter, and about one inch and three-quarters in thickness, allowing for the distortion. Its umbilicus occupies nearly one-third of the entire diameter, and on its outer volution there

are seven distant periodic constrictions, or transverse grooves, which are slightly flexuous and somewhat sigmoidal on the sides, and very little arched on the venter. Between these constrictions there are faint indications of low, rounded ribs, which are obsolete at and near the umbilical margin. The other is an imperfect, but undistorted cast of the interior of the septate portion of the shell and of most of the body chamber, not quite six inches and a quarter in its greatest diameter, and an inch and three quarters in breadth. In other respects the characters of these two specimens are essentially the same.

Professor Yokoyamo, in his monograph of the fossils of the Japanese Chalk, published at Stuttgart in 1890, claims that the *Ammonites planulatus* of Stoliczka is not the *A. planulatus* of Sowerby, but the *A. Gaudama* of Forbes, and refers both to *Desmoceras*. He also includes the "*Haploceras planulatum*" nobis, of page 207 of the third part of this volume, though with a query prefixed, among the synonyms of *Desmoceras Gaudamus*. Dr. Kossmat, on the other hand, (who regards *Ammonites planulatus*, Sowerby, as the type of the subgenus *Puzozia* of the genus *Desmoceras*, divides the *Ammonites planulatus* of Stoliczka into three species, which he calls *Puzozia planulata*, Sowerby, var. *Odiensis*, Kossmat; *P. Gaudama* (Forbes); and *P. crebrisulcata*, Kossmat. He states also that "Whiteaves' *A. planulatus* from Division C (Middle Cretaceous) of the Queen Charlotte Islands, exhibits lesser involution and coarser ribbing (geringere Involution und gröbere rippung)" than the typical *A. planulatus* of Sowerby. But, unfortunately, Dr. Kossmat has not seen any of the specimens of the supposed *A. planulatus* from Cumshewa or Maple Island, or even photographs of them, but only the figure, without any description, of the small and very imperfect specimen on Plate 28, fig. 1, of the third part of the present volume. In the writer's judgment, all these specimens agree fairly well with the descriptions and figures of *Desmoceras (Puzozia) planulatum* (Sowerby) as recently restricted, and differ from them only, so far as can be observed at present, in being a little more tightly rather than more loosely coiled, and, more particularly, in their much straighter periodic constrictions or arrests of growth.

DESMOCERAS (PUZUZIA) BREWERII.

- Ammonites Brewerii*, Gabb. —1864. Geol. Surv. Calif., Palæont., vol. i, p. 62, pl. 10, fig. 7; and (1869) vol. ii, p. 130, pl. 20, fig. 5.
 " " Whiteaves —1876. This volume, pt. 1, p. 21, pl. 1, figs. 2, 2a, and 3, 3a.

A specimen collected at Maud Island by Mr. James Deans in 1898, which is essentially similar to the original of figure 3 on Plate I, of this

volume, has been lent to the writer by the Natural History Society of British Columbia.

Since then Dr. Newcombe has lent to the writer nine specimens that are clearly referable to this species, from two to seven, and even nine inches in their maximum diameter, that he collected at the east end of Maud Island in 1895. Seven of these, including the largest and the largest but one, are marked by large and comparatively distant flexuous, plications which are strongly developed on the sides, but obsolete, or nearly obsolete on the venter. In the largest of these specimens some of the plications are as much as fourteen millimetres apart at their summits, on the outer portion of each of the sides.

A specimen with extremely small and comparatively close-set, flexuous radiating, raised lines, which is apparently referable to this species, was collected at a locality north-west from Yakoun Lake, on the Rennel Sound Trail, by Mr. S. Pearse in 1894, and lent to the writer by Dr. Newcombe.

From the whole of this new material it would appear that the fossil described on page 23, and figured on Plate 1, figures 3 and 3a of the first part of this volume as a dwarfed costate variety of *Ammonites Breweri* is really a small specimen of the typical form of the species, and that the "presumed typical form" described on page 22 of the same publication and represented on Plate 1, figs. 2 and 2a, is a less typical and smoother variety, more nearly related to the next species.

DESMOCERAS (PUZOSIA) HAYDENII.

Ammonites Haydenii, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. 1, p. 62, pl. 10, figs. 8, & 8 a-b.

The writer has long been under the impression that the six specimens referred to on page 23 of the first part of this volume as closely resembling *A. Haydenii*, are really referable thereto. Quite recently Prof. John C. Merriam, who has kindly compared some of these specimens with the types of *A. Haydenii* in the Geological Museum of the University of California at Berkeley, has expressed himself as satisfied with the identity of these two forms. Specimens similar to those obtained by Mr. Richardson were collected at the east end of Maud Island by Dr. Newcombe in 1895, but it seems to the writer that *A. Haydenii* is only a small, smooth form of *A. Breweri*.

DESMOCERAS (PUZOSIA) PEREZIANUM.

Ammonites Perezianus, Whiteaves. 1876. This volume, pt. 1, p. 19, pl. 2, figs. 1 and 1a. But not *A. Perezianus*, D'Orbigny, 1850, Prodr. de Paléont., p. 9.

Haploceras Perezianum, Whiteaves. 1884. This volume, pt. 3, p. 204.

Placenticerus Perezianum, Whiteaves. 1889. Contr. Canad. Palæont., vol. 1, pt. 2, p. 156.
Desmoceras Perezianum, Whiteaves. 1893. Trans. Royal Soc. Canada for 1892, vol. x, sect. 4, p. 114.

Skidegate Channel, west of Alliford Bay, J. Richardson, 1872; South Island (in Skidegate Channel) and north shore of Cumshewa Inlet, Dr. G. M. Dawson, 1878: the specimens referred to on pages 19 and 204 of this volume.

This species was referred to *Haploceras* in 1884 in accordance with Neumayr's classification of the Cretaceous Ammonites, and to *Placenticerus* in 1889, as appearing to agree with Zittel's extended definition of its characters in the second volume of the Handbuch der Palæontologie. It, however, appears to be a fairly typical species of *Desmoceras*, Zittel, (1884) as that genus is now understood.

DESMOCERAS (PUZOZIA) DAWSONI. (N. Sp.)

Plate 37, fig. 3.

Haploceras Beudanti, Whiteaves. 1884. This volume, pt. 3, p. 205, pl. 26, figs. 1 and 1a.
 But probably not the *Ammonites Beudanti* of European authors, nor of Stoliczka.

Shell resembling that of *Puzosia Stoliczkai*, Kossmat* (the *Ammonites Beudanti* of Stoliczka, but not of Brongniart nor D'Orbigny) in shape, septation, and in the large size to which it attains, but differing therefrom, as pointed out by Dr. Kossmat,† mainly in the circumstance that the periodic constrictions of specimens of from two to three or five or six inches in their maximum diameter, are much more flexuous and sigmoidal.

Abundant on the north shore of Cumshewa Inlet, where numerous specimens were collected by Dr. G. M. Dawson in 1878 and by Dr. Newcombe in 1895. At this locality all the specimens have the umbilical margin rounded, and this would seem to be the typical form of the species. The few specimens from Bear Skin Bay, collected by Dr. Dawson in 1878, with a rectangular umbilical margin, should probably be regarded as a variety of *Desmoceras Dawsoni*, for although they very closely resemble the *Ammonites Beudanti* as figured by Pictet and Camichel, it would now seem that more than one species has been described under that name by European writers.

DESMOCERAS (PUZOZIA) MAUDENSE.

Sphenodiscus Maudensis, Whiteaves. 1884. This volume, pt. 3, p. 200, pl. 22, figs. 3 and 3, a-b.

Bear Skin Bay, C. F. Newcombe, 1895: an imperfect and badly preserved cast of the interior of a shell, about five inches in its maximum

* Untersuchungen über die südindische Kreideformation, pt. 3. (184) 119, pl. (24) 18, fig. 6.

† Ibid., p. (185) 120.

diameter, that may possibly be referable to this species. Its venter however, is very narrowly rounded rather than carinate, but the venter of the type of *Sphenodiscus Maudensis* would be better described as obscurely subcarinated than as inconspicuously carinated. The sutural line of this latter specimen, as represented on Plate 22 of this volume, seems to be more like that of *Desmoceras* than of *Sphenodiscus*.

GASTEROPODA.

TROCHACTÆON CYLINDRACEUS? Stoliczka.

Actæonina (Sp. undt.) Whiteaves. 1876. This volume, pt. 1, p. 53.

Trochactæon cylindraceus (Stoliczka) Whiteaves. 1884. Ibid., pt. 3, p. 218, pl. 28, fig. 6.

East end of Maud Island, several specimens; and Bear Skin Bay, one specimen; all collected by Dr. Newcombe in 1895.

These are precisely similar to the specimens previously collected by Mr. Richardson and Dr. Dawson. They are all more or less crushed, distorted and badly preserved casts of the interior of the shell. Their identity or otherwise with *T. cylindraceus* is consequently very uncertain, and it would probably have been better to have distinguished them provisionally by a different specific name, such as *T. Skidegatensis*.

AMAUIOPSIS TENUISTRIATA, Whiteaves.

Amauiopsis tenuistriata, Whiteaves. 1876. This volume, pt. 1, p. 48, pl. 9, figs. 4 and 4a; and (1884) pt. 3, p. 216, pl. 28, fig. 3.

East end of Maud Island, one cast of the interior of the shell and one specimen with the test preserved; and — Peninsula, Cumshewa Inlet, eight casts of the interior of the shell; all collected by Dr. Newcombe in 1895.

SCALARIA CLEMENTINA (Michelin) d'Orbigny.

Melanopsis Clementina, Michelin. 1833. Magas. de Zoologie, pl. 39.

“ “ “ 1838. Mém. Soc. Géol., tome 3, p. 99.

Scalaria Clementina, d'Orbigny. 1842. Pal. Franc., Terr. Cret., tome II, p. 52, pl. 154, figs. 6-9.

“ “ Pictet and Campiche. 1862. Paléont. Suisse, Foss. Terrains Cret. Envir. Sainte-Croix, deuxième partie, p. 333, pl. 72, figs. 12 and 13.

Scalaria Albensis? d'Orbigny. Whiteaves. 1876. This volume, pt. 1, p. 50, pl. 9, fig 5.

Cumshewa Inlet, at a locality about two miles west of the Peninsula and close to the Oil Works, C. F. Newcombe, 1895: a cast of the interior of four of the volutions, with part of the test preserved.

When the fragment referred to on pages 50 and 51, and figured on Plate 9 of the first part of this volume was doubtfully identified with the

Scalaria Albensis of d'Orbigny, Pictet and Campiche's monograph on the Cretaceous fossils of the environs of Ste. Croix was not accessible to the writer. Both it and the specimen collected by Mr. Richardson are practically indistinguishable from Pictet and Campiche's figures of *S. Clementina*, and would now seem to be referable to that species rather than to *S. Albensis*.

PLEUROTOMARIA SKIDEGATENSIS.

Pleurotomaria Skidegatensis, Whiteaves. 1876. This volume, pt. 1, p. 51, pl. 9, figs. 6 and 6 a.

East end of Maud Island, a specimen with part of the test preserved; and south side of Alliford Bay, a large cast of the interior of a shell, which is probably referable to this species; both collected by Dr. Newcombe in 1895.

PELECYPODA.

ANATINA (CERCOMYA) SEMIRADIATA. (N. Sp.)

Plate 37, fig. 4.

Shell strongly compressed, transversely elongated, more than twice as long as high, straight, or at least not distinctly curved. Anterior side shorter, a little broader (in the direction of its height) and more broadly rounded at the end than the posterior; beaks appressed and depressed, placed in advance of the midlength.

About one-third of the distance from the front margin to the posterior extremity there is a faint transverse groove or narrow depression in the cast of each valve. In front of this groove the surface is concentrically and coarsely plicated. Behind it the concentric plications are more feebly developed, and immediately next to it there is a broad submedian triangular area, marked also with fine radiating ridges. But no vestige of the test is preserved in either of the only two specimens that the writer has seen, so that the hinge dentition is unknown. The muscular impressions also are not preserved.

East end of Maud Island, a tolerably well preserved and nearly perfect, but slightly distorted cast of the interior of both valves; and south side of Alliford Bay, a similar, but rather larger, less perfect and worn cast; both collected by Dr. Newcombe in 1895.

A very similar shell to the recently described *Anatina* (*Cercomya*) *punctata*, Stanton,* of the Jurassic rocks of the Yellowstone National Park.

*Geology of the Yellowstone National Park. Monograph xxxii of the United States Geological Survey (1899), p. 628, pl. 74, fig. 5.

THRACIA SEMIPLANATA, Whiteaves.

Thracia semiplanata, 1884. This volume, pt. 3, p. 221, pl. 29, figs 5, 5, a-c.

East end of Maud Island, five good specimens; and Creek near Camp Robertson, two miles south of Yakoun Lake, at an elevation of about 600 feet above the level of the sea, one small specimen; all collected by Dr. Newcombe in 1895.

PLEUROMYA PAPYRACEA, var. CARLOTTENSIS.

Pleuromya Carlottensis, Whiteaves. 1876. This volume, pt. 1, p. 57, pl. 9, fig. 8.

Pleuromya subcompressa, Whiteaves. 1884. Ibid., pt. 3, p. 22, pl. 29, fig. 6. But probably not *Myacites* (*Pleuromya*) *subcompressa*, Meek, if that is a Jurassic species.

Pleuromya subcompressa, var. *Carlottensis*, Whiteaves. 1884. Ibid., pt. 3, p. 223, pl. 29, figs. 7, and 7a.

South side of Alliford Bay, C. F. Newcombe, 1895: one good specimen.

The types of *Pleuromya papyracea*, Gabb, which are now in the Museum of the Academy of Natural Sciences of Philadelphia, have been kindly lent to the writer by Dr. H. A. Pilsbry. They consist of a nearly perfect and well preserved cast of the interior of both valves of an apparently adult shell, forty-five millimetres in length, with small portions of the test preserved, (evidently the original of Plate 29, fig. 66, of the second volume of the Palæontology of California); of an imperfect cast of the interior of a half-grown right valve; and of three very small casts of the interior of both valves, the largest of which is not more than three-quarters of an inch in length.

From a direct comparison with these specimens it would seem that all the concentrically ribbed *Pleuromyæ* from the Queen Charlotte Islands that are described and figured in the first and third parts of this volume should probably be regarded as representing a local and coarsely costate or plicate variety of *P. papyracea*.

Dr. Stanton has expressed the opinion* that *Pleuromya lævigata*, Whiteaves, is a synonym of *P. papyracea*, but, in the writer's judgment, these two forms are quite distinct, *P. lævigata* being much smaller than *P. papyracea*, different in shape and almost smooth, its outer surface being marked only with a few concentric lines of growth.

PLEUROMYA LÆVIGATA, Whiteaves.

Pleuromya (subcompressa? var.) lævigata, Whiteaves. 1884. This volume, pt. 3, p. 224, pl. 30, 1, 1, a-c.

The specimens from Alliford Bay and Maud Island, and probably also those from the Iltasyouco River and "Lower Sandstones" of the south

*In a foot note to page 18 of Bulletin No. 133 of the United States Geological Survey.

side of Maud Island, referred to on pages 224 and 249 of the third part of this volume. But, in the present state of our knowledge, *P. lævigata* can scarcely be regarded as a variety of *P. subcompressa*, if the latter is of Jurassic age.

CYTHEREA (CARYATIS) SUBTRIGONA, Whiteaves.

Callista (?) *subtrigona*, Whiteaves. 1876. This volume, pt. 1, p. 63, pl. 9, fig. 10.

Caryatis subtrigona, Whiteaves. 1884. Ibid., pt. 3, p. 226.

Bear Skin Bay, Skidegate Inlet, C. F. Newcombe, 1895: several specimens. Three miles north-west from Yakoun Lake on the Rennel Sound Trail: a right valve collected by S. Pearse in 1894, and loaned to the writer by Dr. Newcombe in 1895.

THETIS AFFINIS, Whiteaves.

Thetis affinis, Whiteaves. 1884. This volume, pt. 3, p. 226, pl. 30, figs. 4 and 4, a-b.

Three miles north-west from Yakoun Lake on the Rennel Sound Trail, three casts of the interior of both valves, collected by S. Pearse in 1894 and lent to the writer by Dr. Newcombe in 1896.

CYPRINA OCCIDENTALIS, Whiteaves.

Cyprina occidentalis, Whiteaves. 1884. This volume, pt. 3, p. 227, fig. 10.

Lina Island, Skidegate Inlet, C. F. Newcombe, 1897: a cast of the interior of both valves.

PROTOCARDIA SUBSIMILE. (N. Sp.)

Protocardium Hillanum, Whiteaves. 1884. This volume, pt. 3, p. 228, pl. 30, fig. 5.

But probably not *Cardium Hillanum*, Sowerby, 1813.

Shell small, regularly convex, ovately subtriangular, rather narrow above, widening somewhat rapidly below, and nearly as high as long. Anterior side short, subtruncated somewhat obliquely above and narrowly rounded below: posterior side not much longer than the anterior, more obliquely truncated above, rather more produced, and obtusely pointed below: cardinal margin short, umbones moderately prominent: beaks small, curved inward and forward, placed a little in advance of the midlength.

Posterior area of both valves marked by minute radiating ribs, the remainder of the surface with still more minute and densely crowded concentric raised lines.

Dimensions of the only testiferous specimen that the writer has seen (a right valve): length nine millimetres and a half; height, inclusive of the beaks, nine mm.

East end of Maud Island, Dr. G. M. Dawson, 1878: the "perfect right valve" referred to *P. Hillanum* on page 228, and figured on Plate 30, fig. 5, of this volume. A few small but well preserved casts of the interior of shells which are probably referable to this species, were collected on the south side of Alliford Bay by Dr. Dawson in 1878 and by Dr. Newcombe in 1895.

Judging by Sowerby's original description and figure of *Cardium Hillanum*, from the Greensand of Blackdown, the Maud Island specimen would seem to be a very much smaller shell, with a somewhat different marginal outline. As figured in the "Mineral Conchology", *C. Hillanum* is an inch and three-quarters in its maximum length, but the Maud Island right valve may not be that of an adult shell.

MEEKIA SELLA, Gabb.

Meekia sella, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. I, p. 191, pl. 25, fig. 179.

Periploma cuspidatum, Whiteaves. 1884. This volume, part 3, p. 220, pl. 29, figs. 4 and 4, a-b.

Bear Skin Bay, Skidegate Inlet, C. F. Newcombe, 1895: one specimen.

The types of *Periploma cuspidatum* from Maud Island are badly preserved casts of the interior of small specimens, with the valves spread out, which show nothing more than the marginal outline of the shell and a short groove in each valve, curving downward and a little outward on one side of the beak. The largest of these casts is twenty-eight (not "twenty") millimetres in its maximum length, and twenty-four and a half in height. From their general appearance it was supposed that the shorter and "abruptly cuspidate" side was analogous to the beaked posterior side of *Cuspidaria* or *Pandora*, and that the umbonal groove corresponded to the impression of the obliquely transverse, posterior internal rib seen in so many of the Cretaceous Anatinidæ and especially in *Corimya*. It was, however, fully recognized that the marginal outlines of these specimens is singularly like that of the *Meekia sella*, as figured by Gabb.

Quite recently, by the courtesy of Professor Pilsbry, the types of *Meekia sella*, from Martinez, in the Museum of the Academy of Natural Sciences of Philadelphia, have been lent to the writer for examination and comparison. They consist of seventeen different valves, of all sizes, some of which are perfect and well preserved, with the whole of the test remaining. The largest, which is not the one figured by Gabb, is a perfect left valve, fifty millimetres in length, by forty-four in height. These specimens show clearly that the test of *M. sella* is porcellaneous and comparatively thick, not subnacreous and thin as in *Periploma* proper; also that

the pallial line is entire, and not sinuated like that of *Periploma*. Further, the lunule of these Martinez specimens is well defined, and the shorter subcuspidate side of *M. sella* seems to be anterior, as described by Gabb.

The writer is now under the impression that the types of *P. cuspidatum* are mere badly preserved casts of the interior of valves of small specimens of *M. sella*, and that the supposed posterior umbonal groove of the former is the impression of what Gabb calls the "short robust plate" which "separates the anterior muscular scar" of *Meekia* "from the cavity of the beaks".

Conrad's statement (in the first volume of the American Journal of Conchology) that *Meekia sella* is probably the same as *Cyprina bisecta*, can scarcely be correct, as the latter shell would seem to be a well characterized species of *Axinus*. Capt. Vogdes (on page 8 of his "Bibliography relating to the Geology, Palæontology, and Mineral Resources of California") in reference to the genus *Meekia*, says, "there is already a genus *Meekella*, so this will not stand," but he does not seem to be aware that *Meekia* was published by Gabb in 1864, and *Meekella* by White and St. John (for a genus of Carboniferous brachiopoda) in 1868.

ASTARTE CARLOTTENSIS, Whiteaves.

Astarte Packardii, Whiteaves. 1884. This volume, part 3, p. 229, pl. 30, figs. 6, and 6, a-b.

But probably not *A. Packardii*, White, 1880.

Astarte Carlottensis, Whiteaves. 1889. Contr. Canad. Palæont., vol. I, pt. 1, p. 154.

East side of Alliford Bay, four large and beautifully preserved specimens, with the test, and a few fragments; south side of Alliford Bay, abundant in the condition of small but perfect casts; east end of Maud Island, five small examples with the test preserved; G. M. Dawson, 1878.

TRIGONIA DIVERSICOSTATA, Whiteaves.

Trigonia diversicostata, Whiteaves. 1876. This volume, part I, p. 68, pl. 10, fig. 1; and (1884) pt. 3, p. 230.

An imperfect and badly preserved left valve, which is probably referable to this species, was collected at the east end of Maud Island by Dr. Newcombe in 1895. Two small Trigonias, also, collected three miles north-west from Yakoun Lake, on the Rennel Sound Trail, by Mr. S. Pearce in 1894, have been lent to the writer by Dr. Newcombe. One of these is clearly an imperfect but well preserved right valve of *T. diversicostata*. The other, which is a perfect detached specimen, with both valves, but with some of the finer surface markings obscured by remains of the tenacious matrix, is apparently an abnormal variety of that species,

with the angular and subconcentric ribs or plications almost obsolete. A little *Trigonia*, from the Cretaceous rocks on the south side of the entrance to Quatsino Sound, V.I., collected by Mr. Hunt of Alert Bay, and lent to the writer by Dr. Newcombe, is probably a short, ventricose variety of *T. diversicostata*.

ARCA (NEMODON) SIMILLIMA. (N. Sp.)

Nemodon Fischeri, Whiteaves. 1884. This volume, pt. 3, p. 234, pl. 31, fig. 5. But probably not *Arca Fischeri*, d'Orbigny, 1850, which is a Russian Jurassic species.

Shell moderately convex, narrowly elongated, nearly three times as long as high and very inequilateral. Anterior side short, anterior end forming an angular junction with the cardinal border above, thence curving abruptly and obliquely, inward and downward, to the ventral margin below: posterior side fully four times as long as the anterior, posterior end truncated somewhat obliquely and very shallowly concave above, narrowly rounded and a little produced below: cardinal margin straight and slightly ascending from the anterior to the posterior end: umbones broad but not very prominent, placed at a short distance from the anterior end: beaks rather widely separated, small and incurved: cardinal area rather large, marked by continuous longitudinal grooves, which are a little bent opposite the beaks: ventral margin shallowly concave a little in advance of the midlength, narrowly rounded in front of this sinus, much broader and nearly straight behind.

Surface marked by very numerous, small, radiating ribs, and by concentric striæ and lines of growth.

Hinge dentition apparently as in *Nemodon* (Conrad) and consisting of three short, longitudinal, anterior teeth, parallel to the cardinal border, with some granulous teeth opposite the beaks, and of two very long, laminar posterior teeth, which are also parallel to the cardinal border.

East end of Maud Island, Dr. G. M. Dawson, 1878: several well preserved and nearly perfect specimens.

In a previous part of this volume these specimens were identified with *Arca Fischeri*, d'Orbigny, on the strength of Eichwald's statement that that species is from rocks of Neocomian age. These rocks are now regarded as Jurassic, and although the figures of *A. Fischeri** in the second volume of the Geology of Russia in Europe and the Ural Mountains are remarkably similar to the Maud Island specimens, it is scarcely probable that a North American Cretaceous fossil is identical with a Russian Jurassic species.

* Under the name *Arca concinna*, von Buch, which D'Orbigny himself subsequently changed to *A. Fischeri*.

ARCA (NEMODON) CUMSHEWENSIS. (N. Sp.)

Grammatodon inornatus, Whiteaves. 1884. This volume, pt. 3, p. 235, pl. 31, figs. 8, 8, a-b. But probably not *G. inornatus* of Meek and Hayden, (1858) which is said to be a Jurassic species.

Shell, or rather cast of the interior of the shell, small, moderately convex, about one-third longer than high, inclusive of the beaks, and very inequilateral. Anterior side shorter than the posterior: anterior end angular at its junction with the cardinal margin above, rounded and narrowing rapidly inward and downward to the base below: posterior end obliquely subtruncated above, slightly produced and rounded more or less narrowly, in some specimens obtusely pointed, below: ventral margin (or base) nearly straight or but very gently convex for the greater part of its length: superior border, behind the beaks, straight and almost parallel with the ventral margin: umbones broad and moderately prominent, beaks curved inward and forward, placed in advance of the midlength: posterior area tolerably well defined in some specimens but not in others.

Test unknown: surface of well preserved casts of the interior of the shell marked by numerous, closely disposed, minute concentric striæ and by minute, obscure, radiating raised lines. Hinge dentition not well shown in any of the specimens known to the writer, but in one of the casts there are distinct impressions of two or three longitudinally elongated posterior teeth, parallel to the hinge line, in the left valve.

The six specimens collected at Cumshewa and Skidegate inlets by Dr. G. M. Dawson in 1878 and referred to on page 235 of the third part of this volume, are the only ones that the writer has seen.

CUCULLÆA PONDEROSA. (N. Sp.)

Plate 38, figs. 1 and 1a.

Cucullæa (?) Sp. Undt. Whiteaves. 1876. This volume, pt. 1, p. 73.

Cucullæa (*Idonearca*). Species undeterminable. Whiteaves. 1884. Ibid., pt. 3, p. 235.

Shell large, ventricose, subtrapezoidal and very inequilateral: valves so strongly convex in the umbonal region that their maximum breadth or thickness, when closed, exceeds their greatest height, inclusive of the beaks: test thick. Anterior side short: anterior end angular above, at its junction with the cardinal margin, and broadly rounded below: posterior side broader and a little longer than the anterior: posterior end obliquely truncate above and obtusely pointed below. Ventral margin curved rather convexly in advance of the midlength, straighter behind: superior border nearly straight, ascending slightly and very gradually from the anterior to the posterior end: umbones prominent, broad and rather obtuse: beaks widely distant, depressed, curved inward and a little

forward, placed in advance of the midlength : cardinal area very large, broad and marked with well defined, divergent, ligamentary grooves : posterior area not distinctly defined, indicated only by an abrupt inflection of the valves.

The foregoing description is based almost exclusively upon the large and presumably adult specimen figured on Plate 38, which was collected at the east end of Maud Island, by Dr. Newcombe, in 1895. The surface of this specimen is not very well preserved, and its markings consist only of closely disposed concentric striæ. In the small, crushed and imperfect, but testiferous specimen from the same locality, described on page 235, of the third part of this volume, the surface markings are well preserved and consist of numerous and densely crowded minute concentric raised lines, with a few rather coarser incremental ones, both of which are crossed by almost equally minute radiating ridges. On the posterior portion of each valve of this specimen the radiating ridges are close together and not very prominent, but on the central and anterior portions they are distant and rather larger.

The dimensions of the specimen figured are as follows : maximum length, 117 mm. (or upwards of four inches and a half) ; height, inclusive of either umbo, 86 mm. ; greatest breadth or thickness through the closed valves, 100 mm. (or almost four inches) ; approximate distance between the two beaks, 33 mm. ; maximum thickness of test, $5\frac{1}{2}$ mm.

"Skidegate Channel west of Alliford Bay" (and probably Maud Island) J. Richardson, 1872 : the two large casts indicated on page 73 of the first part of this volume. East end of Maud Island, G. M. Dawson, 1878, the small crushed specimen already referred to ; and C. F. Newcombe, 1895, the large and testiferous specimen figured on Plate 38, and a distorted cast of the interior of another.

The specimens collected by Drs. Dawson and Newcombe show that the shape of the shell is not so different from that of the *Cucullæa* from the Nanaimo group of Vancouver and the Sucia Islands, that has been referred by the writer to *C. truncata*, Gabb, as was supposed when only the two casts collected by Mr. Richardson were available for comparison. But there are now some reasons for thinking that the specimens from the localities last mentioned may be specifically, or at any rate varietally distinct from the true *C. truncata*. Through the kindness of Prof. Pilsbry, the writer has recently been able to examine and study ten authentic examples of that species, from Cottonwood Creek, the property of the Academy of Natural Sciences of Philadelphia. The largest of these specimens, however, is only forty-nine millimetres in length, by thirty-six mm. in height, inclusive of the umbones. They seem to differ from the Maud Island specimens, and from those from Vancouver and the Sucia

Islands that have been referred to *C. truncata*, in their uniformly smaller size and more particularly in their proportionately narrower and more pointed umbones. It is just possible that the Maud Island specimens may prove to be nothing more than a large, ventricose, thick-shelled, local or stratigraphical variety of *C. truncata*, with a very broad, ligamentary area, but for the present it is thought desirable to distinguish them by a different specific name.

MODIOLA PERSISTENS. (N. Sp.)

Plate 37, figure 5.

Modiola, (Sp. Undt.) Whiteaves. 1876. This volume, part 1, p. 73.

Modiola subimbricata, Whiteaves. 1884. Ibid., pt. 3, p. 237. But probably not *M. subimbricata*, Meek, 1873, which is said to be a Jurassic species.

Shell of medium size, moderately elongated and slightly arched, rather strongly convex, usually higher than broad, but in one adult specimen broader than high, most prominent in each valve on the umbonal declivity (in the direction of a line that might be drawn obliquely backward and downward from the beak to the base) below and in front of which there is a shallow depression and above it a convex inflection of the valves.

Anterior side short: anterior end rounded and narrowing rapidly into the base, below the beak: posterior side much longer than the anterior and somewhat expanded vertically, highest or deepest at about the midlength: posterior end obliquely subtruncate above, rounded and slightly produced below: ventral margin shallowly concave in some specimens but nearly straight in others: superior border gently and slightly arched, ascending gradually from the anterior end to about the midlength and then sloping gently downward: umbones depressed, beaks curved inward and forward, anterior and terminal.

Surface marked by numerous, minute and close-set, concentric striae, also by coarser and more distant incremental lines

East end of Maud Island, C. F. Newcombe, 1895: two well preserved but not quite perfect specimens; besides those referred to in the first and third parts of this volume, as having been collected by Mr. Richardson and Dr. Dawson.

MELINA SKIDEGATENSIS.

Melina mytiloides ? Lamarck. Whiteaves. 1876. This volume, pt. 1, pp. 80—82, figs. 8, a-d.

Melina Skidegatus, Whiteaves. 1884. Ibid., pt. 3, p. 239.

East end of Maud Island, C. F. Newcombe, 1895: an imperfect but characteristic specimen. North side of Maud Island, C. F. Newcombe, 1897: one specimen.

INOCERAMUS CONCENTRICUS, Parkinson.

- Inoceramus concentricus*, Parkinson. 1820. Trans. Geol. Soc. Lond., vol. v, p. 58, pl. 1, fig. 4.
 " " Sowerby. 1821. Min. Conch., vol. III, p. 183, pl. 305; and of numerous other European palæontologists.
 " " Whiteaves. 1876. This volume, pt. 1, p. 79; and (1884) pt. 3, p. 241.

Three miles north-west from Yakoun Lake, on the Rennel Sound Trail: several specimens of a large variety, with unusually coarse concentric plications, collected by Mr. Robertson in 1894,—and one fairly typical specimen collected by Mr. S. Pearse in that year; all kindly lent to the writer by Dr. Newcombe for comparison and identification.

AUCELLA CRASSICOLLIS (Keyserling) Stanton.

- Aucella Piochii*, Gabb, 1869. (In part.) Geol. Surv. Calif., Palæont., vol. II, p. 194, pl. 32, figs. 92, *a-c*.
 " " Whiteaves. 1882. (In part.) Trans. Royal Soc. Canada, vol. I, sect. 4, p. 84.
 " " Whiteaves. 1884. This volume, pt. 3, p. 239.
Aucella concentrica (Fischer) White. 1884. Bull. U. S. Geol. Surv., No. 4, p. 13, pl. 6, figs. 2-12; and (1885) No. 15, p. 23.
Aucella Piochii, Whiteaves. 1887. (In part.) Geol. and Nat. Hist. Surv. Canada, vol. II, N.S., p. 111B.
Aucella concentrica (Fischer) White. 1889. (In part.) Mon. U. S. Geol. Surv., No. 13, p. 231, pl. 4, figs. 3-5, 11-17, and 21.
Aucella crassicollis (Keyserling) Stanton. 1896. Bull. U.S. Geol. Surv., No. 133, p. 45, pl. 5, figs. 1-13; pl. 6, figs. 1-5.

Skidegate Channel, west of Alliford Bay, J. Richardson, 1872: the specimen referred to on page 239 of the third part of this volume.

The very obscure fossil that was doubtfully referred to *Aucella Mosquensis* on pages 74 and 75 of the first part of this volume and figured on Plate 10, figs. 3 and 3 *a*, is too badly preserved and too much worn to be determined even generically. It is quite possible that it may not be an *Aucella*.

GERVILLEA NEWCOMBII. (N. Sp.)

Plate 39, fig. 1.

Shell large, attaining to a maximum diameter of fully six inches, obliquely subanceolate, about one-third longer than high, with a large broad posterior wing, and a narrow, pointed, horizontally prolonged anterior one; nearly equivalve, the right valve almost as convex as the left, very little if at all twisted, the postero-basal extremity of the left valve of the only adult specimen that the writer has seen being curved a little outward.

Anterior side consisting only of the anterior alation, which is narrow in the direction of its height or depth : posterior side widening or rather increasing rapidly in height backward : posterior end broadly, concavely and rather deeply emarginate at about the midheight, produced and apparently somewhat pointed below : posterior wing extending nearly or quite as far backward as the central portion of the valves : inferior margin forming a long oblique and broadly sigmoidal curve backward and downward from the anterior to the posterior end : cardinal margin straight, horizontal, extended, and forming the longest part of each valve : umbo and beak attenuate, the latter slightly depressed, appressed, pointing forward and placed at a short distance from the anterior end.

Surface apparently almost smooth and marked only by concentric striae of growth. Cartilage pits numerous and well defined.

North side of Maud Island, about a quarter of a mile from Gold Harbour Village, C. F. Newcombe, 1897 : a nearly perfect cast of the interior of both valves, with a portion of the test preserved on the left valve.

The species seems to be well characterized by its peculiar shape, and more especially, by its largely developed posterior wing, by its narrowly produced anterior alation, and extended cardinal margin.

AVICULA (OXYTOMA) WHITEAVESI, Stanton.

Oxytoma mucronata, Whiteaves. 1884. This volume, pt. 3, p. 238, pl. 31, fig. 9, and p. 251, pl. 33, figs. 6, and 6 b ; but not *Avicula mucronata*, Gabb, 1864, as pointed out by Dr. Stanton ; and probably not *Pteria*, or *Avicula*, *mucronata*, Meek and Hayden, 1864, which is said to be a Jurassic species.

Avicula (Oxytoma) Whiteavesi, Stanton. 1896. Bull. U. S. Geol. Surv. Terr., No. 133, p. 38, pl. 4, fig. 1.

East side of Alliford Bay, Skidegate Inlet, Dr. G. M. Dawson, 1878 : the left valve referred to on page 238 and figured on Plate 31 of the third part of this volume. Both in outline and sculpture it is remarkably similar to the shell figured as *Pteria Munsteri* on page 80 of Meek and Hayden's Palæontology of the Upper Missouri, which they suggested might be called *Pteria mucronata* or *Avicula mucronata*.

The specimens from the "Lower Sandstones" of the south side of Maud Island, that were referred to *Oxytoma mucronata* on page 251 of the third part of this volume (with the exception of the original of fig. 6 a on Plate 33 of the present part), are also now believed to be referable to *A. (O.) Whiteavesi*.

Dr. Stanton says that his original description of *A. Whiteavesi* was "drawn from a single specimen found with *Aucella crassicollis*, etc., in the upper part of the Knoxville beds on Shelton ranch, five miles north of Paskenta, Cal. Another left valve referred to the same species,

differing from the type in being slightly higher in proportion to its length, comes from the lower part of the Horsetown beds at Ono, Shasta County. Associated with the Ono specimen there are a number of right valves that probably belong to this species. They have about the same outline, but are much less convex; the posterior wing seems to be more narrow, and the radiating lines are so small as to be inconspicuous except under a lens."

"I think it probable," he adds, "that these fossils are identical with the form" "from the Queen Charlotte Islands that has been referred to the Jurassic *Avicula (Oxytoma) mucronata*, M. and H. Direct comparison of the California specimens with Meek and Hayden's type, which was described and figured under the name *Pteria Munsteri* (Bronn),* shows recognizable differences in both outline and sculpture. When this Jurassic form was described, the name *Pteria mucronata* was suggested for it, in case it should prove to be distinct, but, before this work appeared, Gabb had used *Avicula mucronata* for a Californian Triassic species;† consequently the name *mucronata* can not be applied to either of these species, and I name the Cretaceous form in honor of Mr. Whiteaves. A new name will also be given to the Jurassic species in another publication." (Op. cit. supra.)

In February, 1879, the specimens that have been referred to *O. mucronata* and that are figured on Plates 31 and 33 of this volume, were sent to Dr. Stanton for comparison, and in a letter dated February 15, 1889, he writes as follows in regard to them. "After careful comparisons I think that the originals of figures 6 and 6 b on your Plate 33 are almost certainly, and the original of fig. 9 on your Plate 31 is probably, identical with the form from the Horsetown beds that I referred to my *Avicula Whiteavesi*. But the description and figure of that species were drawn from a single specimen, from a lower horizon, and it may be the differences are really of specific importance. Besides the greater proportional height of the Horsetown specimen, it shows a greater number of radiating ribs, though that difference may be in part due to the imperfect preservation of the type of *A. Whiteavesi*, from which the shell has been exfoliated from the lower portion, where other ribs that do not reach the beaks may be intercalated."

"The sculpture of the original of fig. 6 a on your Plate 33 is so radically different that it seems to me impossible to refer it to the same species as the others. I should judge also that the form is quite different. "If it is like the specimen figured from Devil's Lake it is certainly different. As to its identity or otherwise with *A. Cornueliana*, judging only from

* Palæontology of the Upper Missouri, p. 80, figs. A and B in text.

† Geological Survey of California, Palæontology, vol. I, p. 30, pl. 5, fig. 27.

the figures given by d'Orbigny and Pictet, I should say that on your specimen the interspaces between the principal ribs are flatter and bear more nearly equal, finer and much more numerous radiating striæ. The concentric sculpture is also apparently much less distinct."

In this connection it may be said that the reference of the Devil's Lake specimens to the *A. Cornucliana* of the French and Swiss Neocomian has has not proved satisfactory, and it will be convenient to designate the former by the new specific name *Avicula (Oxytoma) McConnelli*, in honour of their discoverer. The Maud Island specimen represented by fig. 6 a of Plate 33 is probably specifically identical with *A. McConnelli*, but is much too imperfect to admit of a satisfactory comparison with the types of that species.

PECTEN MEEKANUS.

Syncyclonema Meekiana, Whiteaves. 1876. This volume, pt. 1, p. 82, fig. 9.

East end of Maud Island, two specimens; and south side of Alliford Bay, one specimen: C. F. Newcombe, 1895.

GRYPHÆA PERSIMILIS. (Nom. prov.)

Gryphæa Nebraskaensis, Whiteaves. 1884. This volume, pt. 3, p. 244, pl. 32, figs. 2 and 2, a-b. But apparently not *G. calceola*, var. *Nebraskaensis*, Meek & Hayden, 1861, which is said to be a Jurassic species.

Shell of medium size, variable in shape but usually irregularly elongate subovate or ovately subtriangular: front margin, or inferior border, often unequally bilobate. Lower valve deep, either uniformly convex, or impressed with a comparatively distinct submedian longitudinal sulcus, so that the front margin is concavely sinuated near the middle, lobate on both sides, somewhat elongated or produced anteriorly,—and sometimes with a much fainter, lateral and presumably anterior but otherwise somewhat similar sulcus. Umbonal region of the lower valve tumid, the umbo itself strongly incurved, the beak acute and entire in some specimens, but truncated and showing a small scar of attachment in others. Upper valve small, concave externally, with comparatively inconspicuous umbo and beak. Cardinal area not clearly exposed in any of the specimens that the writer has seen.

Surface of some specimens marked only by numerous and closely disposed concentric lines of growth, but in others the umbo of the lower or convex valve is marked also by numerous and equally closely disposed, small, irregular and subparallel, longitudinal raised lines. Hinge dentition and muscular impressions unknown.

Maximum length of the largest specimen that the writer has seen, sixty-eight millimetres.

The specimens from Maud Island and Alliford Bay collected by Dr. G. M. Dawson in 1878 and referred to on page 245 of the third part of this volume, are the only ones known to the writer. In the American Journal of Science for March, 1885, Dr. C. A. White has expressed the opinion that these specimens are more like *Gryphæa navia*, Conrad, than *G. Nebrascensis*, but the lower valve of *G. navia* is said to have a narrowly subtrigonal outline, an angular umbo, and a sharp umbonal ridge.

ANOMIA LINENSIS. (N. Sp.)

Plate 39, fig. 2.

Upper valve (the only one known to the writer) almost flat, but slightly convex in the umbonal region, subcircular but rather irregular in outline, beak small, flattened obliquely downward, and nearly but not quite marginal.

Surface marked by numerous closely arranged and slightly flexuous, radiating raised lines or minute ridges, which are crossed and somewhat interrupted by lines of growth and concentric wrinkles.

Maximum length of one of the best specimens, twenty-seven millimetres; greatest breadth practically the same.

Lina Island, C. F. Newcombe, 1897: three well preserved moulds of the exterior of upper valves, on a cast of the interior of the shell of *Cyprina occidentalis*. The figure and the foregoing description are taken from a gutta percha impression of one of these moulds.

BRACHIOPODA.

TEREBRATULA SKIDEGATENSIS. (Nom. prov.)

Plate 37, figs. 6 and 6 a.

Terebratula (?) Sp. undt. Whiteaves. 1876. This volume, pt. 1, p. 83.

Perhaps a var. of *T. subdepressa*, Stoliczka.

Cfr. *Terebratula subdepressa*, Stoliczka. 1872. Cret. Brachiop. S. India, p. 16, pl. 2, figs. 9-16, and pl. 3, figs. 1-8.

Cfr. *Terebratula robusta*, Whiteaves. 1889. Contr. Canad. Palæont., vol. I., pt. 2, p. 163, pl. 22, figs. 1, 1, a-b, and 2.

Amended description.—Shell rather large, subovate, broader than long, and broadest at about the midlength, sometimes obtusely pointed in front, when adult, but fully as broad as long when not quite full grown: front margin nearly or quite straight, with no distinct fold or sinus.

Ventral valve moderately convex, most prominent in the middle longitudinally, and sloping rapidly downward and outward on each side, its umbo and beak prominent and lightly incurved, the latter truncated and widely perforated: foramen large, circular: deltidium apparently very short and rather wide, but not well shown in any of the specimens that the writer has seen. Dorsal valve flatter, with a much smaller and less prominent umbo and beak than that of the ventral.

Surface marked by fine concentric striæ of growth. On the umbonal region of the dorsal valve of one specimen, also, there are remains of minute radiating striæ. Lower layer of the test minutely and densely punctate. Muscular scars of the dorsal valve elongated and narrow, those of the ventral valve unknown. Loop and hinge dentition also unknown.

Dimensions of the largest specimen collected: greatest length about fifty-six millimetres; maximum breadth, forty-nine mm.; greatest thickness through the closed valves, twenty-eight mm.

East end of Maud Island, C. F. Newcombe, 1895: a slightly distorted cast of the interior of both valves, with portions of the test preserved and showing the muscular impressions on the dorsal valve. North side of Maud Island, C. F. Newcombe, 1897: a cast of the interior of a ventral valve with a small piece of the test preserved. These and the two (not three) "broken and badly preserved specimens" described on page 84 of the first part of this volume, which are probably also from Maud Island, are all that the writer has seen.

RHYNCHONELLA OBESULA. (N. Sp.)

Plate 39, figs. 3, 3 *a*, and 4.

(?) *Terebratella obesa* (Gabb), Whiteaves. 1884. This volume, part 3, p. 245.

Shell transversely subelliptical, much broader than long and rather strongly convex when adult, but ovately subtriangular, fully as high as broad and flatter when young,—with no distinct fold or sinus. Umbo and beak of the ventral valve moderately prominent, its hinge area unknown: umbo of the dorsal valve much less prominent, its beak strongly incurved.

Surface of each valve marked with from twelve to sixteen comparatively large and sharply angular, radiating ribs, with two or three smaller and much less distinct ones on each side. Hinge dentition and muscular impressions unknown.

South side of Alliford Bay,—and north side of Maud Island, Dr. G. M. Dawson, 1878: the specimens doubtfully referred to *Terebratella obesa*,

Gabb, on pages 245 and 246 of the third part of this volume. South side of Alliford Bay, C. F. Newcombe, 1895: a crushed specimen, about twenty-six millimetres in breadth, and showing the characters of the thin, sharp ribs better than any of those that had previously been collected.

It is doubtful whether these specimens should be regarded as representing a small, local and stratigraphical variety of the "*Terebratella obesa*" of Gabb, from the Chico Group of California, (which is probably a *Rhynchonella*) or as a distinct and previously undescribed species. Professor John C. Merriam, who has kindly compared them with the types of that species in the Museum of the University of California, at Berkeley, writes as follows, in regard to this point, in a letter dated October 17th, 1898. "I would not like to form a definite opinion without seeing some more perfect material, but may say that I doubt whether your specimens are *T. obesa*. *T. obesa* is somewhat different in form and seems uniformly to possess more ribs than your specimens. I think our specimen of *T. obesa* has about ten more ribs than the largest specimen among those which you sent.

"*T. obesa* seems to me to be a *Rhynchonella*. The type has on some parts numerous pits, but they are very large and irregular. I think they are formed by some borer, perhaps an unknown sponge. The pits are at any rate quite different from those of the terebratuloids.

"Mr. F. M. Anderson, who is working in Cretaceous palæontology here, has just examined these *Rhynchonellæ* from Skidegate Inlet, and agrees with me that it is safer not to call them *obesa*. He thinks the form is different and suggests that your specimens represent a smaller species than *obesa*, which even in young forms seems to have more ribs than your species. He suggests also that your specimens are from the Horsetown, while *obesa* is from the Chico."

Under all the circumstances it seems most prudent to distinguish these rather coarsely ribbed *Rhynchonellæ* from the Lower Shales of the Queen Charlotte Islands, at least provisionally, by a different and new specific name.

RHYNCHONELLA ORTHIDIODES. (N. Sp.)

Plate 39, fig. 5.

Shell small, compressed, transversely subelliptical and a little broader than long; front margin slightly curved in the middle but apparently devoid of a distinct fold or sinus. Ventral valve flattened somewhat obliquely, with a faint shallow depression at the midbreadth in front, its umbo rather narrow and moderately prominent: dorsal valve uniformly compressed convex, rather more convex than the ventral, beak of the dorsal incurved.

Surface marked by numerous, very small and close set, radiating ribs. Counting the smallest on each side, that can scarcely be seen without the aid of a lens, there are about forty of these ribs on each valve. Hinge dentition and muscular impressions unknown.

Dimensions of the only specimen that the writer has seen: length, inclusive of the beak, about nine millimetres; maximum breadth, not quite twelve mm.; greatest thickness, four mm.

East end of Maud Island, C. F. Newcombe, 1895: a well preserved cast of the interior of both valves, with portions of the inner layer of the test adherent thereto, but with a small piece of one side of the umbo and beak of the ventral valve broken off. In general appearance this little shell is not unlike a small and finely ribbed *Orthis*, but it may not be quite full grown. It has almost the same marginal outline as the *Terebratella Californica* of Stanton,* from the Knoxville beds of California, but that species appears to be a true terebratuloid, with a minutely punctate structure and the beak of the ventral "truncated by the large round foramen."

CŒLEENTERATA.

ASTROCŒNIA IRREGULARIS, Whiteaves.

Astroccenia irregularis, Whiteaves. 1884. This volume, part 3, p. 246, pl. 33, fig. 1.

In 1897 Dr. Newcombe found a reef of this species about a quarter of a mile from Gold Harbour Village, on the north shore of Maud Island, and has since presented a small piece broken from it to the Museum of the Survey.

* Bulletin U. S. Geological Survey, No. 133, p. 33, pl. 1, figs. 12 and 13.

LIST OF FOSSILS FROM THE CRETACEOUS ROCKS OF THE QUEEN CHARLOTTE ISLANDS.*

1. From the "Upper Shales and Sandstones," or Subdivision A of Dr. G. M. Dawson's Report.

Inoceramus labiatus, Schlotheim.
(=I problematicus, Schloth., et auct.)

2. From the "Coarse Conglomerates," or Subdivision B of Dr. Dawson's Report.

Fragment of guard of Belemnite, species indeterminable.

3. From the "Lower Shales and Sandstones," or Subdivision C of Dr. Dawson's Report.

FISHES.

Scales of a small teleost.

CRUSTACEA.

DECAPODA.

Homolopsis Richardsons, H. Woodward.

MOLLUSCA.

CEPHALOPODA.

<i>Phylloteuthis incertus</i> .	<i>Olcostephanus cepoides</i> .
<i>Belemnites assimilis</i> .	" <i>oblatum</i> .
" <i>Skidegatensis</i> .	" (<i>Astieria</i>) <i>Deansii</i>
<i>Nautilus</i> (<i>Cymatoceras</i>) <i>Carlottensis</i> .	<i>Perisphinctes Carlottensis</i> .
<i>Phylloceras Knoxvillense</i> , Stanton. Var.	" <i>Skidegatensis</i> .
<i>Lytoceras Batesii</i> (Trask).	<i>Holcodiscus Laperousianus</i> .
<i>Lytoceras</i> (<i>Gaudryceras</i>) <i>Sacya</i> (Forbes).	" <i>Cumshewaensis</i> .
<i>Lytoceras</i> (<i>Tetragonites</i>) <i>Timotheanum</i>	<i>Hoplites Haidaquensis</i> .
(Mayor).	" <i>Yakounensis</i> .
<i>Turrilites Carlottensis</i> .	" <i>Newcombii</i> .
<i>Turrilites</i> (species indeterminable).	<i>Desmoceras latidorsatum</i> (Michelin).
<i>Hamites</i> (<i>Ptychoceras</i>) <i>glaber</i> .	<i>Desmoceras</i> (<i>Puzozia</i>) <i>planulatum</i>
<i>Hamites</i> (species indeterminable.)	(Sowerby).
<i>Diptychoceras</i> (species indeterminable).	" " <i>Perezianum</i> .
<i>Schloenbachia inflata</i> (Sowerby).	" " <i>Dawsoni</i> .
<i>Acanthoceras spiniferum</i> .	" " <i>Brewerii</i> (Gabb.)
<i>Olcostephanus Richardsons</i> .	" " <i>Maudense</i> .
" <i>Loganianus</i> .	<i>Ancyloceras Remondi</i> , Gabb.

*All the species for which no author's name is given, have either been or are here described by the writer.

GASTEROPODA.

Pleurotomaria Skidegatensis.
Calliostoma constrictum.
Scalaria Clementina, (Michelin) d'Orbigny.
Vanikoro pulchella.
Amauropsis tenuistriata.

Pseudomelania (species indeterminable).
Nerinea Maudensis.
Cerithium Skidegatense.
Trochactæon cylindraceus ? Stoliczka.
Cinulia pusilla.

PELECYPODA.

Teredo Suciensis.
Martesia carinifera.
Corbula concinna.
Thracia semiplanata.
Anatina (*Cercomya*) *semiradiata*.
Pleuromya papyracea, var. *Carlottensis*.
Pleuromya lævigata.
Goniomya (species indeterminable).
Pholadomya ovuloides.
Tellina Skidegatensis.
Cytherea (*Caryatis*) *subtrigona*.
Thetis affinis.
Cyprina occidentalis.
Protocardia subsimile.
Astarte Carlottensis.
Unio Hubbardi, Gabb.
Trigonia Tryoniana ? Gabb.
 “ *diversicostata*.
 “ *Dawsoni*.
 “ *Maudensis*.
Meekia sella, Gabb.
Yoldia arata.
Nucula solitaria ? Gabb.
Nucula (*Acila*) *truncata*, Gabb.

Arca (*Nemodon*) *simillima*.
Arca (*Nemodon*) *Cumshewaensis*.
Trigonoarca tumida.
Cucullæa ponderosa.
Lithodomus Maudensis.
Modiola persistens.
Mytilus lanceolatus ? J. Sowerby.
Melina Skidegatensis.
Inoceramus Moresbyanus.
 “ *concentricus*, Parkinson.
 “ (*Actinoceramus*) *sulcatus*,
 Parkinson.
Aucella crassicolis (Keyserling) Stanton.
Gervillia Newcombii.
Meleagrina amygdaloidea.
Avicula (*Oxytoma*) *Whiteavesi*, Stanton.
Pecten Meekanus.
Pecten (*Entolium*) *lenticularis*.
 (= *Amusium lenticulare*, W.)
Camptonectes curvatus ? Geinitz.
Gryphæa persimilis.
Ostrea Skidegatensis.
Anomia Linensis.

MOLLUSCOIDEA.

BRACHIOPODA.

Terebratula Skidegatensis.
Rhynchonella obesula.

Rhynchonella orthidioides.

CÆLENTERATA.

ANTHOZOA.

Astrocænia irregularis.

4. From the "Agglomerates," or Subdivision D of Dr. Dawson's Report.

Three undeterminable fragments, apparently of the shells of pelecypoda, one of which looks like a piece of the exfoliated valve of an *Ostrea*.

5. From the "Lower Sandstones," or Subdivision E of Dr. Dawson's Report.

CEPHALOPODA.

Schloenbachia propinqua. | Sphenodiscus Requierianus? D'Orbigny.

GASTEROPODA.

Pleurotomaria Skidegatensis. | Cinulia (species indeterminable).

PELECYPODA.

Pleuromya laevigata?		Avicula (Oxytoma) McConnelli?
Cardium tumidulum.		Lima (species indeterminable).
Protocardia (species indeterminable).		Pecten Carlottensis.
Avicula (Oxytoma) Whiteavesi, Stanton.		

BRACHIOPODA.

Rhynchonella Maudensis. | Discina (?) semipolita.

OTTAWA, March, 1899.

PLATE XXXIII.

(With the exception of the coral (fig. 1), all the fossils represented on this Plate, are from the Lower Sandstones of the south side of Maud Island).

ASTROCÆNIA IRREGULARIS (page 246).

- Figure 1. Calicular surface of a portion of a colony, drawn from a gutta percha squeeze of a specimen from the Lower Shales at Maud Island.

SCHLOENBACHIA PROPINQUA (page 247).

- Figure 2. Side view of the largest entire specimen collected.
" 2 a. Outline of aperture of the same.
" 2 b. Side view of a smaller but better preserved specimen.
" 2 c. Similar view of a large fragment.

PLEUROMYA LÆVIGATA (pages 249 and 289).

- Figure 3. Side view of the most perfect specimen yet collected from the Lower Sandstones.

CARDIUM TUMIDULUM (page 249).

- Figure 4. Side view of a specimen, slightly enlarged.
" 4 a. Similar view of another specimen.

PROTOCARDIUM ; species undeterminable (page 250).

- Figure 5. Side view of the specimen referred to on page 250, shewing the left valve.

AVICULA (OXYTOMA) WHITEAVESI (page 298).

(The *Oxytoma mucronata* of page 251.)

- Figure 6. Side view of an imperfect left valve.
" 6 b. Similar view of a perfect right valve.

AVICULA (OXYTOMA) McCONNELLI (page 300).

- Figure 6 a. An imperfect left valve, that is doubtfully referred to this species.

PECTEN CARLOTTENSIS (page 251).

- Figure 7. One of the most perfect specimens collected (which, however, wants both ears) with a small piece of the test about twice the natural size, to show the surface ornamentation.

RHYNCHONELLA MAUDENSIS (page 252).

- Figure 8. Dorsal view of a perfect specimen.
" 8 a. Front view of the same.
" 8 b. Ventral view of the same.

DISCINA SEMIPOLITA (page 252).

- Figure 9. Upper valve of a specimen with the test preserved, slightly enlarged.
" 9 a. Imperfect cast of the interior of another upper valve, shewing part of the muscular impression, and slightly enlarged.

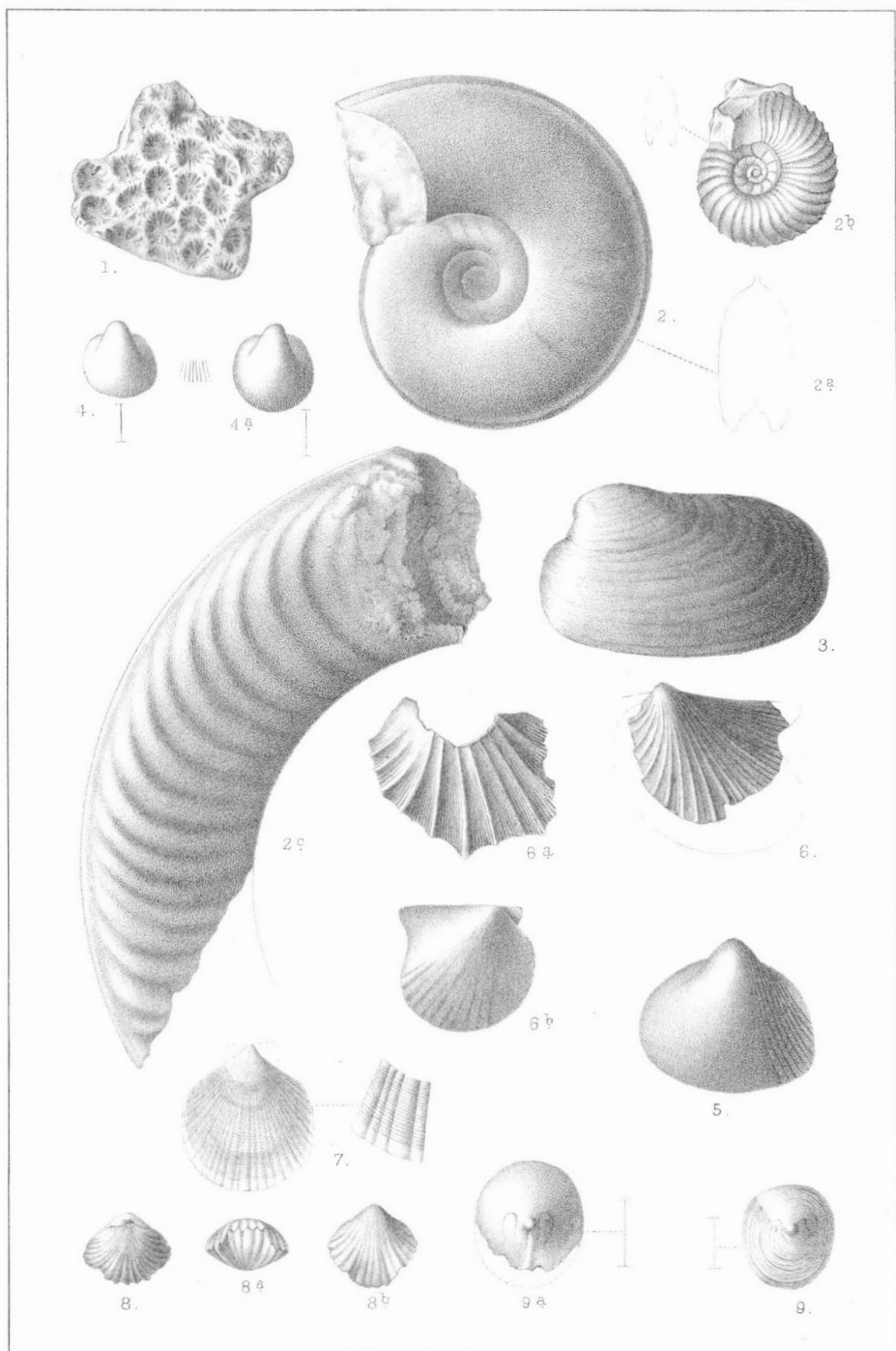


PLATE XXXIV.

TURRILITES CARLOTTENSIS (page 271).

The fine specimen from Bear Skin Bay referred to in the text, three-fourths of the natural size, and in outline only.



$\frac{3}{4}$

PLATE XXXV.

PHYLLOTEUTHIS INCERTUS (page 268).

Figure 1. The only specimen collected.

ACANTHOCERAS SPINIFERUM (page 273).

Figure 2. Side view of the largest specimen yet collected, two-thirds
 the natural size.

“ 3. Side view of a small but very perfect specimen, of the
 natural size.

“ 3 *a*. Ventral view of the same.

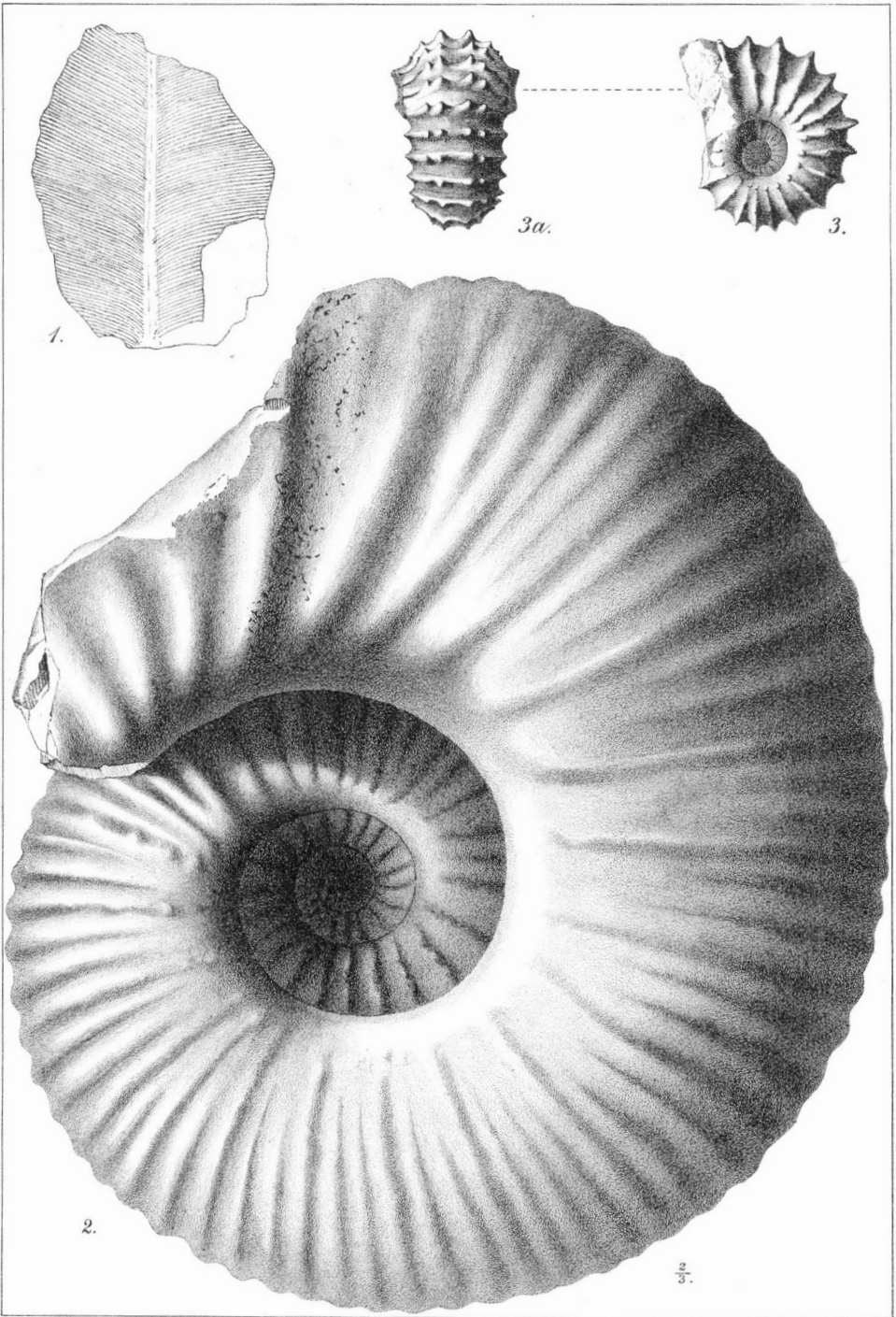


PLATE XXXVI.

HOPLITES YAKOUNENSIS (page 280).

Figure 1. Side view of the specimen from the east end of Maud Island, referred to in the text.

" 1 *a*. Ventral view of the same.

" 1 *b*. Outline of aperture of the same.

DESMOCERAS (*PUZOTIA*) *PLANULATUM*? var. (page 282).

Figure 2. Side view of the more perfect of the two specimens from Maple Island, described in the text, four-fifths the natural size.

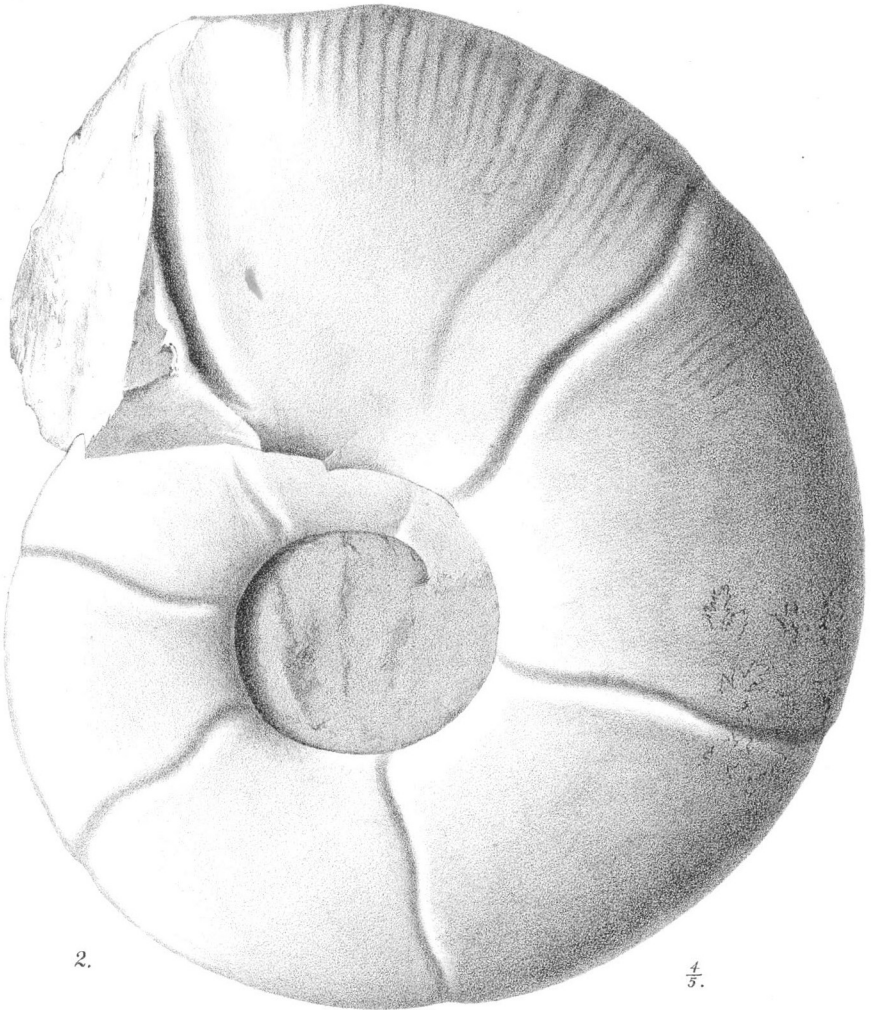
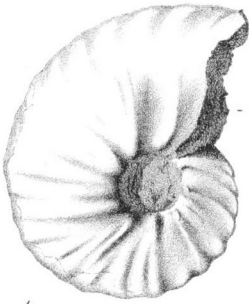


PLATE XXXVII.

HOPLITES NEWCOMBII (page 281).

Figure 1. Side view of the type of this species.

“ 1 *a*. Ventral aspect of the same.

DESMOCERAS (PUZOZIA) PLANULATUM? var. (page 282).

Figure 2. Apertural view, in outline, of the specimen figured on Plate xxxvi, fig. 2, four-fifths of the natural size.

DESMOCERAS (PUZOZIA) Dawsoni (page 286).

Figure 3. Apertural view, in outline, of a specimen from the north shore of Cumshewa Inlet, collected by Dr. Dawson in 1878.

ANATINA (CERCOMYA) SEMIRADIATA (page 288).

Figure 4. Side view of a specimen from Maud Island, shewing the right valve.

MODIOLA PERSISTENS (page 296).

Figure 5. Side view of a specimen from the east end of Maud Island, slightly restored, and shewing the right valve.

TEREBRATULA SKIDEGATENSIS (page 301).

Figure 6. Dorsal view of a specimen from Maud Island, collected by Dr. Newcombe.

“ 6 *a*. Profile view of the same.

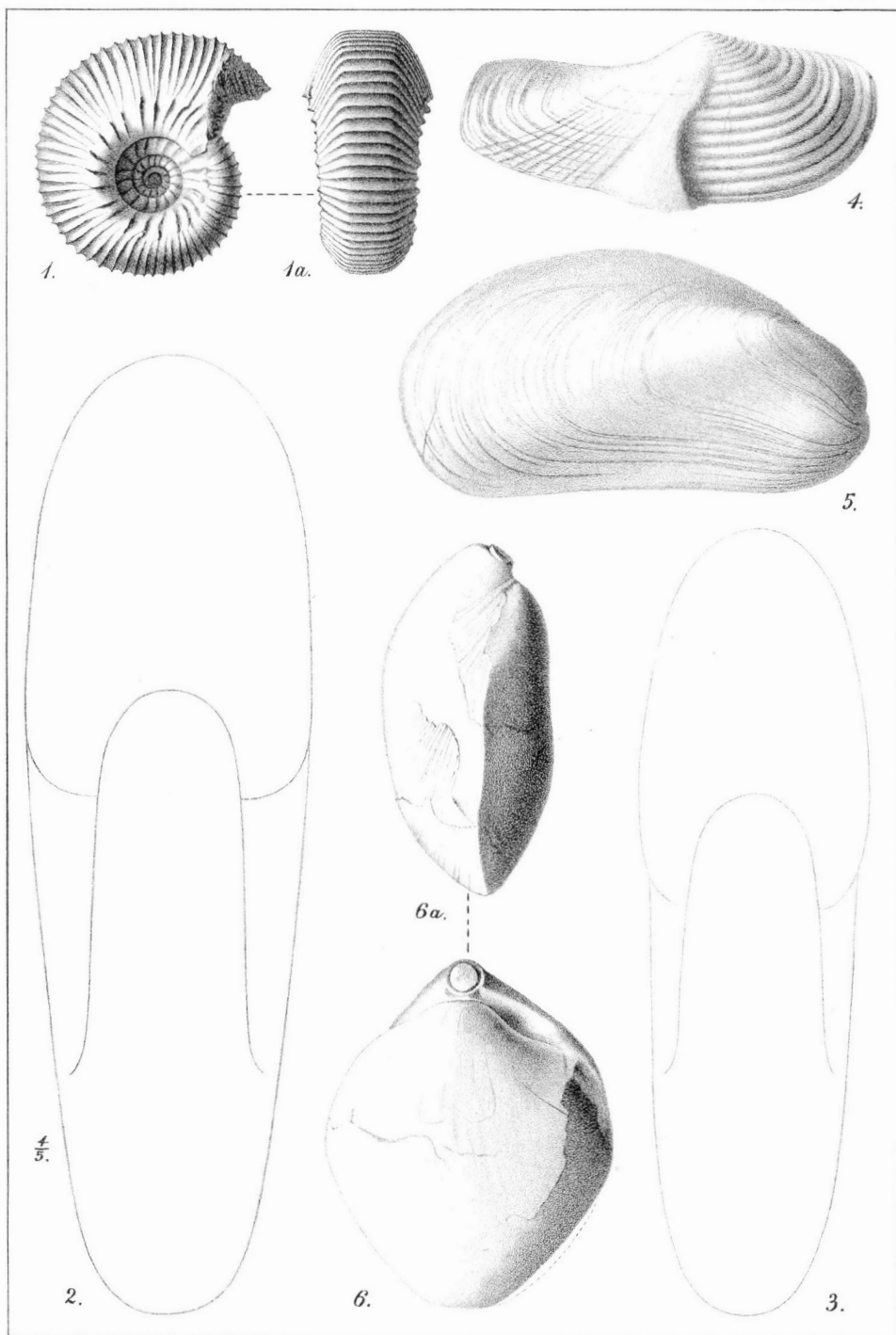


PLATE XXXVIII.

CUCULLÆA PONDEROSA (page 294).

- Figure 1. Side view, in outline, of the large and testiferous specimen
 from the east end of Maud Island, collected by Dr.
 Newcombe, and referred to in the text.
- “ 1 *a.* The same, also in outline, as seen from above, to show the
 breadth of the specimen, and the proportionate size of
 the large cardinal area.

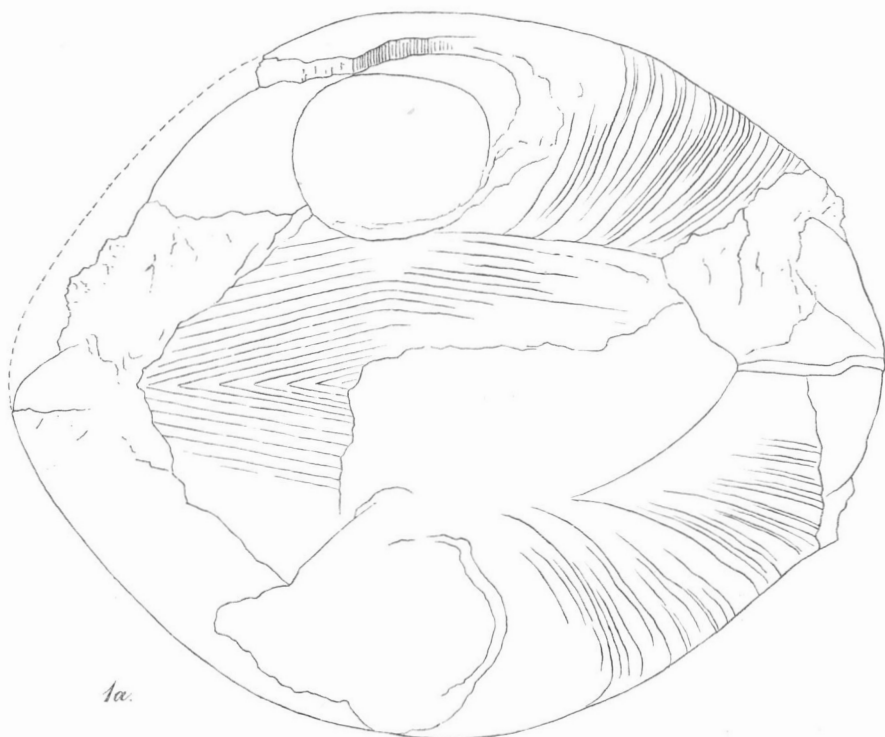
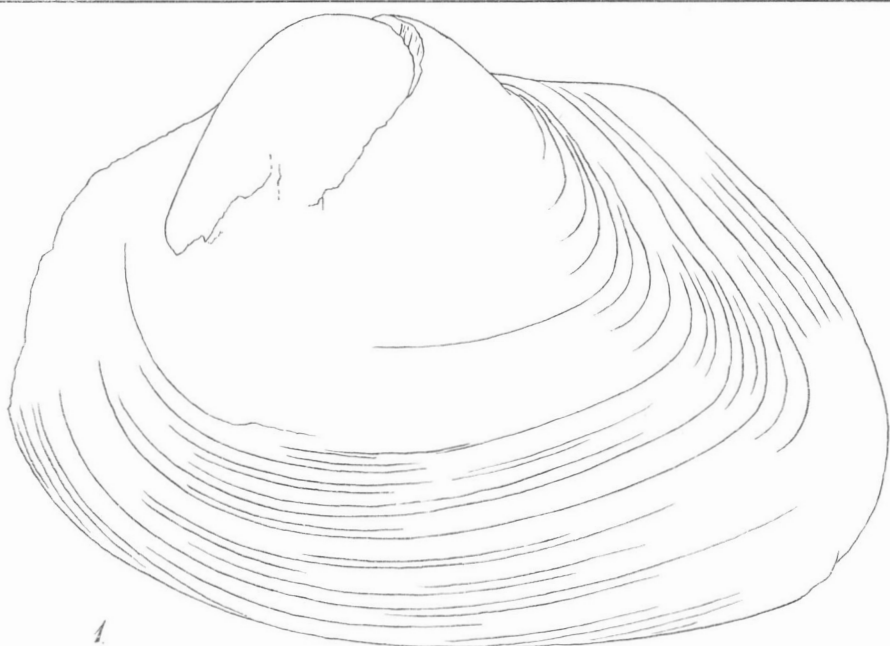


PLATE XXXIX.

GERVILLEA NEWCOMBII (page 297).

- Figure 1. Side view of the type of this species, showing the left valve.

ANOMIA LINENSIS (page 301).

- Figure 2. Upper valve, drawn from a gutta percha squeeze of a natural mould of that valve, from Lina Island.

RHYNCHONELLA OBESULA (page 302).

- Figure 3. Ventral view of a nearly perfect but crushed specimen, from the south side of Alliford Bay, collected by Dr. Newcombe.

“ 3 a. Dorsal view of the same.

- “ 4. Outline of an undistorted but imperfect specimen, which shows the relative convexity of the two valves as seen from above. In this specimen both of the beaks have been worn away by exposure.

RHYNCHONELLA ORTHIDIOIDES (page 303).

- Figure 5. Dorsal view of the only specimen known to the writer, twice the natural size.

