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IV.—*On some Fossils from the Nanaimo group of the Vancouver Cretaceous.*

By J. F. WHITEAVES.

(Read May 23, 1894, but revised to date.)

The present communication consists partly of notes upon some recently received fossil brachiopoda, mollusca and crustacea from the "Nanaimo group," with descriptions of a few species which appear to be new, and partly of a revision of the nomenclature of certain fossils from that formation which have previously been reported upon in the second part of the first volume of "Mesozoic Fossils," published by the Geological Survey of Canada in 1879.

The new material upon which it is based is as follows: (1) The whole of the fossils from the "Nanaimo group" in the Provincial Museum at Victoria, kindly lent to the writer by its curator, Mr. John Fannin, and including a large series of fossils collected by Mr. Walter Harvey, of Comox, in 1892, at Hornby and Denman islands; (2) collections of Cretaceous fossils made by Dr. C. F. Newcombe on the Comox River, V. I., at Hornby Island in 1892, and at the Sucia Islands in 1894, and obligingly forwarded by him; and (3) a small series of Cretaceous fossils collected by Mr. Harvey at Hornby Island in 1894, which have been sent to the writer for identification. The new decapod crustacean which is described but not figured in this paper will probably be illustrated in the fourth and concluding part of the first volume of "Mesozoic Fossils," now in course of preparation.

MOLLUSCOIDEA.

BRACHIOPODA.

RHYNCHONELLA SUCIENSIS. (Sp. nov.)

Plate 3, fig. 1.

Shell moderately convex, subovate, with an apparently feebly developed mesial fold and sinus. Ventral valve a little longer than broad, with a narrow, elongated and nearly straight beak; dorsal valve broader than long, with a comparatively obtuse and incurved beak. Surface markings of both valves consisting of numerous (about twenty-two) narrow, prominent, acute raised ribs, which extend from the beaks to the anterior margin.

Sucia Islands, J. Richardson, 1874, one rather small but perfect speci-

men and two single valves; and Dr. C. F. Newcombe, 1894, six single valves.

MOLLUSCA.

PELECYPODA.

GRYPHÆA VESICULARIS, Lamarck.

- Ostrea vesicularis*, Lamarck. 1806. Ann. Mus., vol. viii., p. 160, pl. 22, fig. 3; and (1819) Hist. An. Sans Vertéb., vol. vi., p. 219.
- “ “ Goldfuss. 1826. Petref. Germ., vol. i., p. 23, pl. 81, fig. 2.
- “ “ D'Orbigny, Pal. Franc., Terr. Crétac., vol. iii., p. 742, pl. 487, figs. 1 and 2, but not figs. 6, 8 and 9.
- Ostrea convexa*, Say. 1820. Am. Journ. Sc. and Arts, vol. ii., p. 42.
- Gryphæa convexa*, Morton. 1828. Journ. Ac. Nat. Sc. Philad., vol. vi., p. 79, pl. 4, figs. 1 and 2, and pl. 5, figs. 1-3; also (1834) Synops. Org. Rem. Cret. Gr. U. S., p. 53, pl. 4, figs. 1-2.
- Gryphæa mutabilis*, Morton. 1828. Journ. Ac. Nat. Sc. Philad., vol. vi., p. 81, pl. 4, fig. 3: and (1834) Synops. Org. Rem. Cret. Gr. U. S., p. 53, pl. 4, fig. 3.
- Gryphæa vesicularis*, Meek. 1876. Rep. U. S. Geol. Surv., Terr., vol. ix., p. 20 (which see, for several European and U. S. synonyms, not included in this list), pl. 11, figs. 2 *a*, *b*, *c*, and pl. 16, figs. 8, *a-b*.

Howe Sound, Mr. J. Fannin, 1884: one lower valve, about fifty-one millimetres long and fifty-seven broad. It is ovately subtriangular in outline, broader than long, and its posterior side is produced and somewhat pointed below. Nanaimo, V.I., two specimens; one a very gibbous lower valve, sixty-five mm. long and forty-two broad; the other, seventy millimetres in length by forty-nine in breadth, with both valves preserved *in situ*, but with a much less convex lower valve; both of them elongate subovate in marginal outline and almost equilateral. In two of the specimens the lower valve is strongly and regularly convex, but it is not lobed posteriorly by a distinct longitudinal groove or sinus on or near the front margin, in either of the three.

These free and narrowly convex shells look very different to the broad, irregularly subhemispherical specimens, with a broad surface of attachment to the umbo of the lower valve, from the Fort Pierre group of the Dakota Cretaceous, which Mr. Meek referred with some doubt to *O. vesicularis*. Still they correspond fairly well with Goldfuss' description and figures of the typical form of that species, which he calls the "var. *A*," and describes as "*testa rostrata libera*;" also with Morton's figures of *G. convexa*, Say, and with one of Stoliczka's figures (Cret. Faun. S. India, pl. 42, fig. 4) of *O. vesicularis*.

INOCERAMUS DIGITATUS (Sowerby) Schmidt.

Inoceramus digitatus (Sowerby), Schmidt. 1873. Petref. Kreideform. Insel Sachalin, in Mem. Ac. Imp. des Sc. de St. Petersburg, vol. xix., no. 3, p. 25, pl. 5, figs. 10 and 11, and the whole of pls. 6 and 7.

Inoceramus undulatoplicatus (F. Roemer), Schluter. 1877. Kreide-Bivalven. Zur Gattung Inoceramus, p. 22, pl. 3, fig. 1.

“ “ Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, pl. 168, pl. 20, figs. 2 and 2a.

Inoceramus digitatus (Sowerby), Jimbo. 1894. Beitr. zur Kenntniss der Fauna der Kreideform. von Hokkaido, in Dames and Kayser's Palæont. Abhandl. (Jena), Neue Folge, Band ii., heft 3, p. 43, pl. 8 (24), figs. 8-10.

The specimens of this species collected by Mr. Richardson on Vancouver Island in 1871 and 1872, and referred to in the second part of the first volume of the "Mesozoic Fossils," are nearly all of small size, though one individual, as there stated, is fully five inches and a-half in height. Some of them are higher than long, with a short hinge-line, and others longer than high, with a long hinge-line. Their sculpture also is equally variable, and consists either of continuous, concentric or radiating and divergent plications, or of corresponding rows of tubercles, in addition to the lines of growth.

In a paper on "Cretaceous Fossils from the Vancouver Island region,"¹ Dr. C. A. White doubts the correctness of the identification of the specimens collected by Mr. Richardson with *I. undulato-plicatus*, but they agree very well with Roemer's description, though perhaps not quite so well with his figure of that species.

However this may be, several small *Inocerami*, which are evidently conspecific with those collected by Mr. Richardson, were obtained by Dr. C. F. Newcombe in 1892 on the Comox River, V. I., and kindly presented by him to the Museum of the Geological Survey. With one exception, these specimens from Comox are all longer than high and have a long hinge-line. Their sculpture consists of concentric plications, which are rarely quite parallel with the closely and regularly disposed impressed lines of growth, upon the umbonal and central regions of each valve, and of radiating and divergent folds anteriorly.

The only specimen collected by Dr. Newcombe on the Comox River that is higher than long, with a short hinge-line, has very peculiar sculpture. In addition to the ordinary growth-lines, a nearly central and continuous longitudinal plication runs from the beak of the left valve (the only one preserved) to the base, a little in advance of the centre of the latter. On the anterior side, five simple plications radiate obliquely forward and outward from this subcentral fold, and on the posterior side

¹ Bull. U. S. Geol. Surv., No. 51, pt. 3, p. 37.

four plications, three of which are simple and one bifurcating, radiate also obliquely forward and outward from it.

In a letter received in August (1894) the writer was informed by Mr. T. W. Stanton (of the U. S. Geological Survey) that he had been recently studying a number of specimens of *Inocerami* with divergent radiating plications, from the Niobrara shales of Colorado, that he has no hesitation in referring to the *I. digitatus* of Sowerby, as re-defined and figured by Schmidt and Schluter, and that it seems to him quite likely that *I. undulato-plicatus*, Roemer, is only the young of that species. Schluter, in his paper on the Cretaceous *Inocerami*, is, indeed, inclined to keep these two forms separate, but Schmidt (*op. cit.*) regards both *I. undulato-plicatus*, Roemer, and *I. diversus*, Stoliczka, as mere synonyms of *I. digitatus*. Mr. Stanton adds, in effect, that although none of Schmidt's figures of *I. digitatus* exactly duplicate those of *I. undulato-plicatus* in the "Mesozoic Fossils," it still seems to him most likely that the Vancouver specimens are young individuals of *I. digitatus*, a conclusion in which the present writer entirely concurs.

NUCULA RICHARDSONII. (Sp. nov.)

Nucula pectinata, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 161, pl. 18, fig. 8, but not *N. pectinata*, Sowerby, 1818.

Shell similar to *N. pectinata*, but less inequilateral and much shorter in proportion to its height, the beaks being more nearly central, the posterior side longer and more obliquely truncated, the anterior shorter and more broadly rounded at its outer termination.

The slightly distorted left valve from the lower part of the Trent River, Vancouver Island, which was referred with doubt to the *N. pectinata* of Sowerby by the present writer in 1879, appears to be sufficiently distinct from that species to warrant the new specific name now proposed for it, in memory of its discoverer.

NUCULA HORNBYENSIS. (Nom. prov.)

Plate 3, fig. 2.

Perhaps a variety of *N. solitaria*, Gabb.

Cfr. *Nucula solitaria*, Gabb. 1869. Geol. Surv. Calif., Palæont., vol. ii., p. 197, pl. 32, fig. 94.

Shell of medium size for the genus, compressed convex, subelliptical in marginal outline, rather oblique and very inequilateral. Anterior or longer side obliquely subtruncated at its extremity above and rather narrowly rounded below; posterior or shorter side very regularly but narrowly rounded at the end; ventral margin broadly rounded, but rather more convex posteriorly than anteriorly; superior border nearly straight

but slightly descending in front of the beaks, and sloping obliquely and much more rapidly downward behind them; beaks small, incurved and recurved, projecting very little above the highest level of the superior border, placed behind the midlength, and in one specimen almost terminal.

Surface almost smooth, marked only by a few faint concentric striæ of growth; test thin.

Dimensions of the largest specimen known to the writer: length, eleven millimetres; height, eight millimetres. The specimen figured is not quite six millimetres in length.

Northwest side of Hornby Island, in the "Middle Shales or Division D" of Mr. Richardson's Comox Section, W. Harvey, 1894: one right valve, one left valve, and a somewhat crushed specimen with both valves, each with the test preserved.

These specimens may represent a variety of *Nucula solitaria*, but if Mr. Gabb's figure of that species is correct it must have a very different marginal outline. His illustration represents a much more triangular shell than that of *N. Hornbyensis*, with a more prominent beak, and more pointed at both ends.

Nucula Traskana, Meek, from the Cretaceous rocks of Vancouver Island, was described from a single worn cast of the interior of the shell, which has never been figured and has since been lost. Mr. Meek states that the specimen was "probably provided with a distinct lunule," and that "the species will probably be recognized by its ventricose trigonal ovate form and nearly central beaks." This description is quite inapplicable to the specimens from Hornby Island, in which the lunule and escutcheon are both obsolete.

CLISOCOLUS DUBIUS, Gabb.

Loripes dubius, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 177, pl. 24, figs. 170 and 171.

Clisocolus dubius, Gabb. 1869. Geol. Surv. Calif., Palæont., vol. ii., p. 189, pl. 30, fig. 7.

Lucina Richardsonii, Whiteaves. 1874. Geol. Surv. Canada, Rep. Progr. for 1873-1874, p. 266, pl. of foss., fig. 1.

Thetiopsis circularis, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i, pt. 2, p. 153.

Clisocolus dubius, White. 1889. Bull. U. S. Geol. Survey, no. 51, p. 41, pl. 6, figs. 5-7.

The specimens from Vancouver, Hornby and the Sucia islands, which the writer first described as *Lucina Richardsonii*, and afterwards referred to the *Thetis circularis* of Meek and Hayden, the type of Meek's suggested genus *Thetiopsis*, are obviously identical with the *Clisocolus dubius* as since figured by Dr. C. A. White, and with specimens from the Chico group of Shasta County, California, labelled *C. dubius*, and kindly loaned by Mr. Stanton. It still, however, appears to the writer that the

specimens collected by Mr. Richardson are much more like the *Thetis circularis*, as figured by Meek and by Whitfield, than they are to Gabb's illustrations of *C. dubius*.

CLISOCOLUS CORDATUS, Whiteaves.

Clisocolus cordatus, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., p. 157, pl. 18, figs. 3, 3 *a-b*, but probably not *Cyprina cordata* of Meek and Hayden (1857) nor *Clisocolus dubius*, Gabb.

“ “ White. 1889. Bull. U. S. Geol. Surv., no. 51, p. 41, pl. 6, figs. 8 and 9.

The identification of the Sucia Islands specimens collected by Mr. Richardson with the species from the Fox Hills group of Dakota, which was first described by Meek and Hayden as *Cyprina cordata* and subsequently by Meek as *Sphæriola cordata*, has not proved satisfactory, and they seem to be quite distinct from Gabb's *Clisocolus dubius*.

CYTHEREA NITIDA, Gabb. (Sp.)

Cytherea Leonensis, Etheridge. 1861. Quart. Journ. Geol. Soc. Lond., vol. xvii., p. 432, but not *C. Leonensis*, Conrad, 1857.

Cytherea Conensis (err. typ. for *Leonensis*), Etheridge. 1863. The No. 42 of the list of specimens on page 243 of Capt. Palliser's official report.

Venus (Mercenaria?) varians, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 161, pl. 23, figs. 140 and 141.

Meretrix nitida, Gabb. 1864. *Ib.*, p. 165, pl. 23, figs. 145 and 146.

Chione varians, Gabb. 1869. Geol. Surv. Calif., Palæont., vol. ii., p. 239.

Caryatis nitida, Gabb. 1869. *Ib.*, p. 240.

Cytherea (Caryatis) plana, Whiteaves. 1879, Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, pl. 17, figs. 14, 14 *a-b*; but probably not "*Venus planus*," Sby., nor *Aphrodina Tippiana*, Conrad.

The writer has long been convinced that the specimens from Hornby, Vancouver and the Sucia islands, which he identified with the "*Venus planus*" of Sowerby, in 1879, are not that species, but the *Caryatis nitida* of Gabb. In December, 1892, Mr. Stanton examined these specimens while on a visit to Ottawa, and expressed the opinion that they could not be distinguished from *Chione varians*, Gabb. Since then Mr. Stanton has forwarded a series of each of these nominal species from the Chico group of California, and both he and the writer have quite independently come to the conclusion that the characters which Mr. Gabb relied upon to distinguish his *Caryatis nitida* from *Chione varians* are neither constant nor sufficient to justify their separation.

CYTHEREA ARATA, Gabb.

Meretrix arata, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 166, pl. 30, fig. 250.

“ “ Gabb. 1869. *Ib.*, vol. ii., p. 240.

Cytherea (Callista) laciniata, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 148, pl. 17, figs. 13 and 13a, and pl. 19, figs. 4 and 4a, but perhaps not *Cytherea (Callista) laciniata*, Stoliczka, 1871.

The specimens referred to *Cytherea (Callista) laciniata*, Stoliczka, in the “Mesozoic Fossils” (*op. cit.*, p. 148) have recently been found to be exactly similar to a specimen from the Chico group of Tehama County, California, which Mr. Stanton has identified with *Meretrix arata*, Gabb, and kindly loaned to the writer. The original description of the sculpture of *M. arata* is rather misleading. According to Mr. Gabb, its surface is “ornamented by regular, concentric, acute impressed lines,” whereas, in the writer’s judgment, it would be much more correct to say by small, concentric, rounded ribs, with very narrow furrows between them.

CYPRIMERIA LENS, Whiteaves.

Cyprimeria lens, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 152, pl. 17, figs. 15 and 15a, but not *Meretrix lens*, Gabb, 1864, which is probably not a *Cyprimeria*.

“ “ White. 1889. Bull. U. S. Geol. Surv., no. 51, p. 42.

Shell compressed convex, moderately inflated, ovately subcircular in marginal outline, and nearly as high as long; posterior side a little longer, and in some specimens rather more narrowly rounded than the anterior; basal margin broadly convex; superior border descending rapidly and obliquely in front of the beaks, gently convex and slightly prominent immediately behind them, thence curving gradually downward to the posterior end; beaks placed a little in advance of the mid-length, small, depressed, appressed and curved forward. No definite nor distinctly-margined lunule, and apparently no well-defined escutcheon.

Test rather thick, its surface polished and marked with numerous very fine and closely disposed concentric striæ, also with four or five distant and coarser linear concentric grooves or periodic arrests of growth.

Hinge with two cardinal teeth and one lateral tooth in the left valve. The two cardinal teeth are transverse and divergent, the anterior one being thick and excavated in the middle, but not bifid. The lateral tooth, which is thin and feebly developed, is partially separated from the cardinal fulcrum by a narrow, shallow groove. Anterior muscular impression large and subovate; posterior muscular scar, pallial line and hinge dentition of the right valve unknown.

Northwest side of Hornby Island, J. Richardson, 1872: one left valve. Sucia Islands, J. Richardson, 1874; three imperfect right valves

and one left valve, the latter showing the hinge dentition of that valve ; and Dr. C. F. Newcombe, 1894 : one large and perfect left valve.

These are most probably not identical with the *Meretrix lens* of Gabb, as the writer once supposed they were. The specimen from Hornby Island is a little more pointed posteriorly than those from the Sucia Islands, but this feature is rather exaggerated in the unsatisfactory figure of this specimen, on Plate 17 of the "Mesozoic Fossils." The specimens from the Sucia Islands have more the general contour of a *Dosinia* than of a *Meretrix* (or *Cytherea*, as that genus is more frequently called), and their hinge dentition is that of *Cyprimeria*. In the original description of *Meretrix lens* nothing is said, and nothing appears to be known, about the hinge dentition or other characters of the interior of the shell, but there are at present no valid reasons known to the writer for doubting the correctness of its reference to the genus *Cytherea* or *Meretrix*.

Mr. Stanton, who has kindly compared the Sucia Islands specimens with Meek's types of *Cyprimeria* (?) *tenuis*, from Vancouver and Newcastle islands, thinks that the latter species (whose internal characters are still unknown) is much more compressed and has a different outline.

TELLINA OCCIDENTALIS, Whiteaves.

Tellina (*Peronæa*) *occidentalis*, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 144, pl. 17, figs. 11 and 11 a ; but not *Tellina occidentalis*, Morton, 1842, which is a *Lucina* ; nor *Thracia* (?) *occidentalis*, Meek, 1857.

The specimens from Gabriola Island and the Nanaimo River, which the writer formerly supposed to be referable to *Thracia occidentalis*, Meek, prove to be distinct from that shell, which Mr. Stanton states has a "pearly lustre and other characters of the *Anatinidæ*."

GASTEROPODA.

EUNEMA CRETACEUM. (Sp. nov.)

Plate 3, fig. 3.

Shell small, imperforate, apparently elongate turbinate, with the spire about equal in height to the outer volution, as viewed dorsally, though the few specimens collected so far are so crushed that their exact original shape is uncertain. Volutions five or six, those of the spire step-shaped or shouldered, but flattened somewhat obliquely next to the shoulder above, the outer volution rounded and moderately ventricose below the shoulder ; suture distinct and angular.

Surface marked with narrow but comparatively distant spiral ridges, which are crossed by very numerous, close set and regularly arranged,

acute, longitudinal, thread-like raised lines. On the dorsal portion of the last volution of the spire there are three of these spiral ridges, and upon that of the outer volution about seven. Test thin, its inner layer distinctly nacreous.

The exact dimensions cannot be given, but an average specimen is estimated to have been eleven millimetres and a-half in length and nine in maximum breadth, when perfect.

Northwest side of Hornby Island, W. Harvey, 1894: four or five crushed specimens.

This interesting little shell is referred to the genus *Eunema* mainly on the authority of Zittel,¹ who states that *Amberleya*, Morris and Lycett, and *Eucyclus*, Deslongchamps, are synonymous with it, and that it ranges in time from the "Lower Silurian" into the Cretaceous.

NERINÆA DISPAR? Gabb. (Var.)

Plate 3, fig. 4.

Cfr. *Nerinaea dispar*, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 113, pl. 19, figs. 66 and 66 a.

Shell essentially similar in shape and surface markings to *N. dispar*, but smaller, and devoid of the rounded spiral fold at the base of each volution said to be characteristic of that species, also with the longitudinal ribs apparently obsolete on the lower volutions.

Hornby Island, W. Harvey, 1894: three specimens. The most perfect of these has seven volutions preserved, with the minute details of the sculpture of each quite clearly shown. The three upper volutions are marked with small longitudinal ribs which cross the volutions transversely, but on the three lower volutions these ribs appear to be absent, though their absence may be due to the exfoliation of part of the outer layer of the shell.

TESSAROLAX DISTORTA, Gabb.

Tessarolax distorta, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 126, pl. 20, figs. 82 and 82, a-b.

" " Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 123.

Northwest side of Hornby Island, in the "Middle Shales or Division D" of Mr. Richardson's Comox section, W. Harvey, 1894: nine specimens, most of them preserved in a very brittle shale.

CYPRÆA SUCIENSIS. (Nom. prov.)

Plate 3, fig. 5.

Shell small, moderately inflated, narrowly subovate and a little more than half as broad as long, emarginate at both ends, but much more

¹ Handbuch der Palæontologie, vol. ii., 1884, p. 189.

deeply so posteriorly than anteriorly. Spire entirely covered when the outer coating of enamel is perfect, but in the only specimen collected the enamel is partially exfoliated in such a way as to show that underneath it the spire is very small, conical, and composed of at least four volutions, also that it extends just as far backward as the produced posterior end of the outer lip. This partial exfoliation of the outer layer of enamel is, however, barely perceptible to the naked eye, and is not shown in the figure. Outer volution very large in proportion to the rest, broadest and most inflated a little behind the mid-length, abruptly attenuate behind, but narrowing much more gradually in front, its anterior margin being narrowly rounded; outer lip thickened exteriorly and considerably produced behind; inner or columellar lip also produced behind and separated from the outer lip by a narrow channel or canal; characters of the interior of the aperture unknown, though it clearly extended the whole length, and is narrow and linear behind.

Surface smooth.

Dimensions of the specimen described (which has been kindly presented by its discoverer to the Museum of the Geological Survey); length, twenty millimetres; greatest breadth, twelve millimetres.

Sucia Islands, Dr. C. F. Newcombe, 1894.

Most of the aperture of this interesting little fossil is filled with the tough and tenacious matrix, so that it is impossible to ascertain whether there are or are not any crenulations on the inner surface of the outer lip, or any denticulations or plications on the columellar side. The external characters of the specimen, however, would seem to show that it is a small smooth *Cypræa*, very closely allied to the *C. Cunliffei* of Forbes,¹ from the Arrialloor group of the Trinchinopoly district of Southern India, and it may prove to be only a variety of that species. The *Cypræa Bayerquei* and *C. Mathewsoni*, described in the first and second volumes of the Palæontology of California as from the Tejon group of that state, are now generally regarded as Eocene fossils.

CEPHALOPODA.

PHYLLOCERAS VELLÆDÆ, (Michelin) D'Orbigny.

Ammonites Vellædæ (Michelin), D'Orbigny. 1840. Pal. Franc., Terr. Cret., vol. i. p. 280, atlas, pl. 82; also of Pictet and Campiche, and Stoliczka.

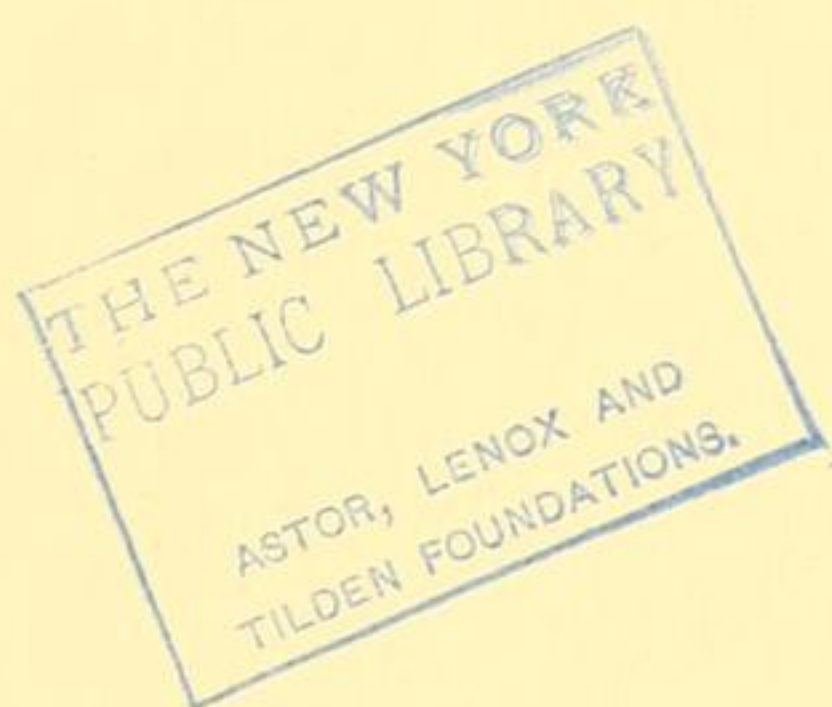
Ammonites (Scaphites?) ramosus, Meek. (1857.) Trans. Albany Institute, vol. iv., p. 45.

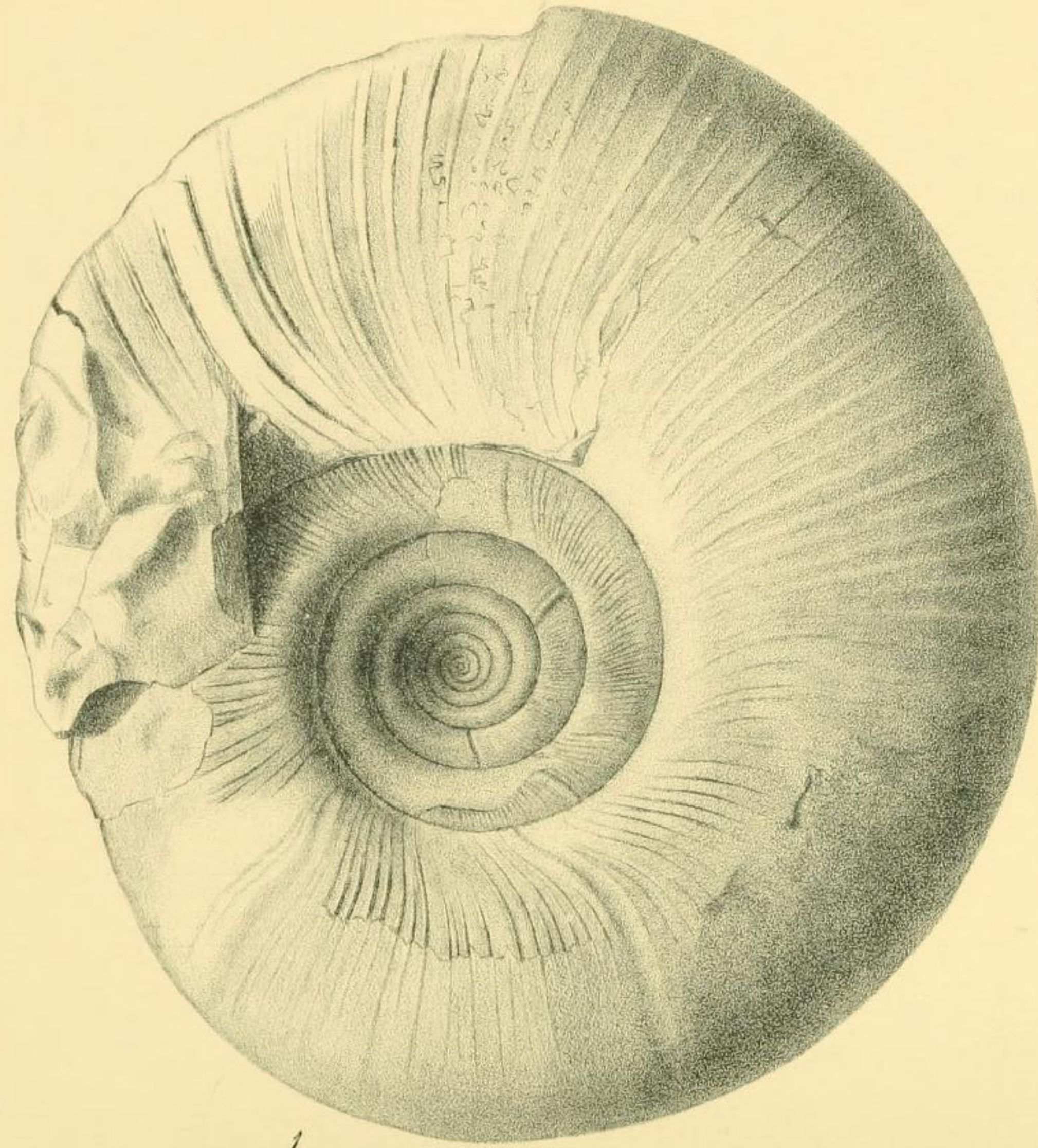
Phylloceras ramosus, Meek. 1876. Bull. Geol. and Geogr. Surv. Terr., vol. ii., no. 4, p. 371, pl. 5, figs. 1, 1, *a-b*.

Ammonites Vellædæ, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 103.

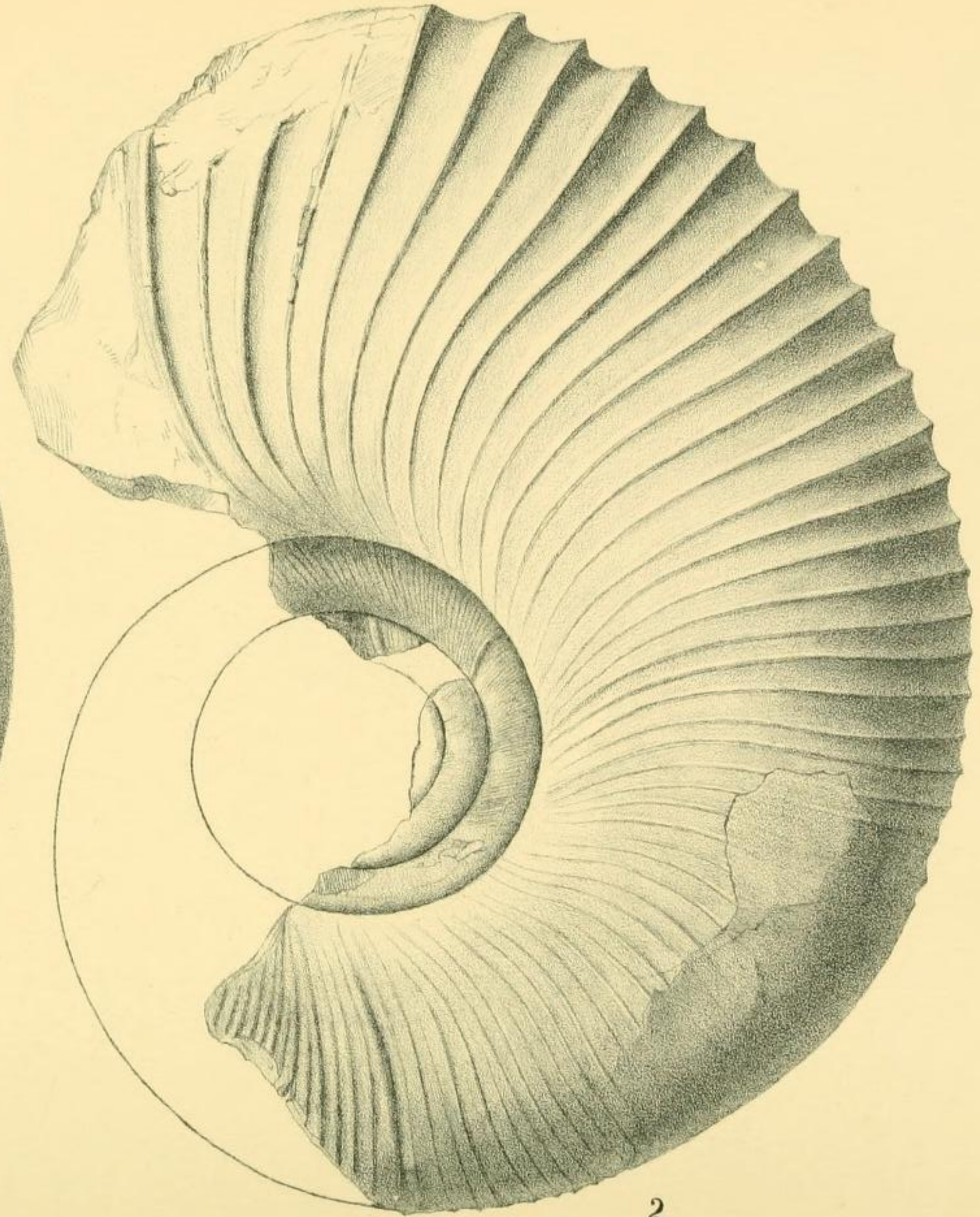
Northwest side of Hornby Island, W. Harvey, 1892: two fine speci-

¹ Trans. Geol. Soc. Lond., vol. vii. (1846), p. 134, pl. 12, fig. 22; and Stoliczka (1868), Cret. Foss. S. India, vol. ii., p. 55, pl. 4, fig. 4.





1.



2.

mens. The smaller of these, which is now in the Museum of the Geological Survey, is seventy-four millimetres, or nearly three inches, in its greatest diameter.

PHYLLOCERAS INDRA. (Var.)

- Ammonites Indra*, Forbes. 1846. Trans. Geol. Soc. Lond., vol. vii., p. 105, pl. 11, fig. 7.
 “ “ Stoliczka. 1865. Cret. Cephalop. S. India, vol. i., p. 112, pl. 58, fig. 12.
 “ “ Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. 1., pt. 2, p. 105, pl. 13, figs. 2 and 2 a.

Northwest side of Hornby Island, W. Harvey, 1892: a single specimen, about four inches and a-half in its maximum diameter, which is apparently referable to this species. Its volutions, however, are more nearly circular than those of the type of *Ammonites Indra*, as described and figured by Stoliczka, and than those of the specimen from Hornby Island collected by Mr. Richardson in 1871. Its surface, also, is marked by numerous but very faint and almost obsolete spiral ribs, in addition to the usual and equally faint curved transverse furrows and fine lines of growth.

LYTOCERAS JUKESII, Sharpe.

Plate 2, figs. 1 and 2.

- Ammonites Jukesii*, Sharpe. 1853. Descr. Foss. Rem. Mollusc. found in Chalk of England, p. 53, pl. 23, figs 11, *a-e*.
 “ “ Pictet and Campiche. 1858-60. Pal. Suisse, Foss. St. Croix, pt. i., p. 350.
 “ “ Whiteaves. 1876. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 111, pl. 13, figs. 3, 3, *a-b*.

Middle of east side of Denman Island, W. Harvey, 1892: four fine specimens, one a little less and three a little more than four inches in their maximum diameter.

The specimen from Norris Rock, south of Hornby Island, which was referred to this species, though with some doubt, in the second part of the first volume of “Mesozoic Fossils,” is a fragment of the inner whorls, a little more than two inches in diameter, which has been described in detail and figured. Three of the specimens from Denman Island have at least seven of the volutions preserved, and all four are referred with some confidence to *A. Jukesii*, which proves to be a *Lytoceras*, as suspected in 1879. In one of these specimens (figure 2) the sculpture of the test is beautifully preserved on the outer volution. It consists of very narrow, sharp and prominent simple transverse ribs, which curve convexly forward next to the umbilical margin, but are nearly straight on the sides and periphery. At the commencement of the volution these ribs are two

millimetres apart on and near the periphery, but the flat, smooth intervals between them gradually become wider and wider, until at last the ribs in the same region, near the aperture, are as much as seven millimetres apart.

A characteristic fragment of this species was collected by Mr. Harvey in 1892, on the northwest side of Hornby Island.

ANISOCERAS VANCOUVERENSE, Gabb. (Sp.)

Hamites Vancouverensis, Gabb. 1864. Geol. Surv. Calif., Palæont., vol. i., p. 70, pl. 13, fig. 18.

Northwest side of Hornby Island, W. Harvey, 1893: one good specimen, upwards of five inches in length and four in its greatest breadth, which is now in the possession of the Provincial Museum at Victoria, B.C. The maximum diameter of the shelly tube of which it is composed is forty-five millimetres. The "prolonged portion," as Stoliczka calls it, is much longer than the "reflected portion," and the former is slightly incurved posteriorly.

A much more perfect specimen, which measures nearly eight inches in its maximum length, and which has been described and figured in the "Canadian Record of Science" for April, 1895, has been collected quite recently by Mr. Harvey at Hornby Island. This specimen shows that the earlier portion of the shell in this species is narrowly elongated, sinuous, spirally twisted and curved obliquely outward, as in *Anisoceras*, before becoming straight and prolonged, and that it does not consist of a slender shelly tube bent twice or more upon itself, as in *Hamites*.

HAMITES OBSTRACTUS, Jimbo.

Hamites cylindraceus, Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 113, pl. 14, figs. 2 and 2a, but not *H. cylindraceus* of DeFrance or D'Orbigny.

Hamites obstrictus, Jimbo. 1894. Beitr. zur Kennt. der Fauna der Kreideform. von Hokkaido, in Dames and Kayser's Palæontol. Abhandl., n. ser., vol. vi., p. 38, pl. 7 (23), figs. 2, 2, a-b.

Posterior extremity of the shell unknown, the prolonged and reflected portions slender, straight, almost circular in outline in transverse section, unless when abnormally compressed, and separated from each other by a space about equal in width to the maximum diameter of the reflected portion, near the aperture.

Surface marked by prominent, narrow, simple and rarely bifurcating transverse ribs, which are rounded at their summits and separated by rather deep concave furrows. Besides the ribs, or rather furrows, there is a single transverse constriction on the reflected portion of the shell. On the prolonged portion the ribs are about one millimetre apart, but on the reflected portion they are nearly two millimetres apart.

Sutural line as represented on plate 14, figure 2a, of the second part of the first volume of "Mesozoic Fossils," published by the Geological Survey of Canada.

Sucia Islands, J. Richardson, 1874: one crushed specimen, with the sutural line well preserved. Northwest side of Hornby Island, W. Harvey, 1893: two good specimens, one of them apparently free from distortion. All three, upon the whole, agree remarkably well with Jimbo's description and figures of *H. obstrictus*, although in that species there are two transverse constrictions of the prolonged portion of the shell, as well as one on the reflected portion, and the lobes and saddles of its sutural line are perhaps not quite so numerously incised as those of the specimen from the Sucia Islands.

DESMOCERAS GARDENI, Baily.

Ammonites Gardeni, Baily. 1855. Quart. Journ. Geol. Soc. Lond., vol. ii., p. 456, pl. 11, fig. 3.

" " Stoliczka. 1865. Cret. Ceph. S. India, vol. i., p. 61, pl. 33, fig. 4,

" " Whiteaves. 1879. Geol. Surv. Canada, Mesoz. Foss., vol. i., pt. 2, p. 102.

Desmoceras Gardeni, (Baily), Zittel. 1884. Handbuch der Palæont., vol. ii., p. 466.

Puzosia Gardeni, Kossmat. 1894. Jahrbuch der k. k. geolog. Reichsanstalt, vol. xlv., p. 472.

Comox River, V. I., Dr. C. F. Newcombe, 1892: two specimens.

PACHYDISCUS OOTACODENSIS, Stoliczka. (Sp.)

Ammonites Ootacodensis, Stoliczka. 1865. Cret. Cephal. S. India, p. 109, pl. 54, figs. 3 and 4, and plates 56 and 57.

Pachydiscus Ootacodensis, Kossmat. 1894. Jahrbuch der k. k. geolog. Reichsanstalt, vol. xlv., p. 472.

In the paper last quoted a fine specimen of this species is stated to have been recognized by Dr. Kossmat in a part of Sir James Hector's collection from Nanaimo, now in the British Museum (Natural History) at South Kensington. It is difficult, however, to see how the Ammonite from Vancouver Island, which Mr. Gabb figures on Plate 27 of the first volume of the Palæontology of California as *A. Newberryanus*, can be distinguished from *Pachydiscus Ootacodensis* on the one hand, or from *P. Suciensis* (the *Ammonites complexus*, var. *Suciensis*, of Meek) on the other. This Ammonite has long been known to be quite distinct from *Ammonites Newberryanus*, Meek. An essentially similar specimen, which may therefore be referable to *P. Ootacodensis*, was collected by Mr. Richardson in 1873 at Northwest Bay, Vancouver Island. It is the specimen referred to as No. 2 on page 109 of the second part of the first volume of "Mesozoic Fossils," published by the Geological Survey of Canada, under the heading *Ammonites complexus*, var. *Suciensis*.

PACHYDISCUS HARADAI, Jimbo.

Plate 3, fig. 6.

Pachydiscus Haradai, Jimbo. 1894. Beitr. zur kenntniss der Fauna der Kreideform. von Hokkaido, in Dames and Kayser's Palæont. Abhandl., n. s., vol. vi., p. 29, pl. 2 (18), figs. 2, 2, *a-b*.

Cfr. also *Ammonites Egertonianus* (Forbes), Stoliczka. 1865. Cret. Cephal. S. India, p. 104, pl. 53, figs. 1-4.

Nanaimo River, ten miles from its mouth, A. Raper, May, 1893: a fine specimen about six inches in its maximum diameter, which agrees remarkably well with Jimbo's description and figures of *P. Haradai*. It differs, however, very little from the type of *Ammonites Egertonianus*, Forbes, as figured by Stoliczka, or from *Pachydiscus Suciensis*. Its volutions are compressed at the sides, the periphery is regularly rounded, and the umbilicus occupies rather less than one-third of the entire diameter. There are eleven large, continuous and distant simple ribs on the outer volution, with from one to four rather smaller and shorter ribs between them, and the intervals between all of them are finely and transversely striated.

BELEMNITES. (Species undeterminable.)

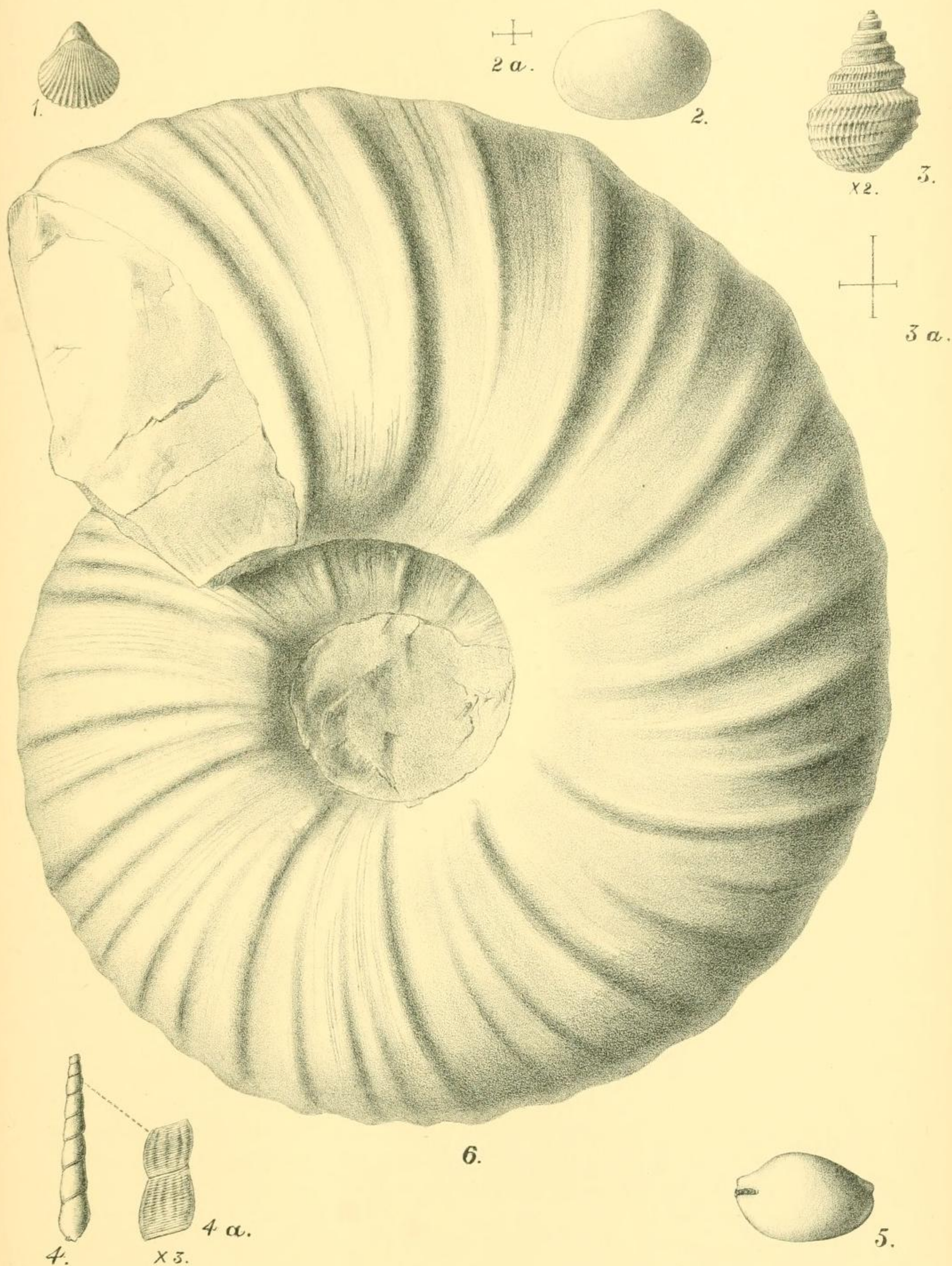
Beach at Hornby Island, W. Harvey, 1892: a slender phragmocone, forty millimetres long and seven millimetres broad at the larger end. The chambers are very numerous and the siphuncle is marginal.

CRUSTACEA.

DECAPODA.

PODOCRATES VANCOUVERENSIS. (Sp. nov.)

Carapace flattened, rectangular, longer than broad, marked by three low angular tuberculose, or spinose longitudinal ridges, one in the median line, and one near each of the lateral margins, and divided at about one-third the distance from the front by an obtusely subangular cervical groove, which is rather broad but not very deep. On the anterior portion, or cephalic arch, the lateral longitudinal ridges are well developed, and armed with larger and more spinose tubercles than those on the corresponding ridges of the posterior portion, one a little behind the mid-length on each ridge being larger than any of the others, but the central ridge is obsolete. In its place, just in advance of the cervical groove, there is an ovate lanceolate or narrowly spear-shaped area, which is elevated at the pointed end anteriorly, shallowly depressed posteriorly, and margined with a single row of small tubercles. Immediately in front of this area there is a pointed or spinose tubercle, almost in a line with



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the largest tubercle on each of the lateral ridges, and still farther forward there are two similar tubercles at a short distance from the anterior margin and about seven millimetres apart. On the posterior portion, or scapular arch, the three longitudinal ridges are minutely tuberculated, and extend from the posterior margin to the cervical groove, where they each terminate in a pointed tubercle larger than any of the rest, but the central ridge is shorter than either of the two lateral ridges. Antero-lateral angles of the carapace each armed with a nearly straight but slightly divergent spine. Rostrum, central portion of the anterior margin and position of the eyes unknown. External antennæ broad and flattened at their bases, inner antennæ cylindrical at theirs.

Walking feet slender, as is usual in the genus.

In addition to the spines and tubercles on the lateral ridges and elsewhere, as already described, the whole of the upper surface of the carapace is minutely granulose and apparently setose, the perforations at the summits of each of the granules and numbers of minute objects, which seem to be detached setæ, being plainly visible under an ordinary lens.

Two miles up the Puntledge River, Vancouver Island, Rev. G. W. Taylor, 1889: a good specimen of the carapace, with the rostrum and a small piece of the anterior portion broken off, but with considerable portions of the ambulatory feet and the bases of the inner and outer antennæ preserved. This interesting fossil is now in the Museum of the Geological Survey of Canada.

Hornby Island, W. Harvey, 1893: a less perfectly preserved specimen, showing most of the carapace (but not the rostrum), portions of the ambulatory feet, and the dorsal aspect of four segments of the abdomen, though it is uncertain whether their margins were denticulated or not.

In the second volume of Transactions of this Society the writer described a long-tailed decapod crustacean from the Cretaceous rocks at the Highwood River in Alberta, under the provisional name *Hoploparia* (?) *Canadensis*. Dr. C. Schluter, of Bonn, Germany, in a letter dated February 20, 1890, expresses the opinion, which appears to be well founded, that this species, which is figured on plate 11 of the first part of the first volume of "Contributions to Canadian Palæontology," is a *Podocrates*, closely allied to, if not identical with, the *P. Dölmensis* of Becks. *Podocrates Canadensis*, as it should now be called, may prove to be only a local variety of *P. Dölmensis*, but *P. Vancouverensis* seems to differ from that species in the much smaller proportionate size of the tubercles on the three longitudinal ridges on its carapace, especially posteriorly, and in the different arrangement of the distant spinose tubercles on the anterior moiety of its cephalic arch.

