

3.—NEW MOLLUSCAN FORMS FROM THE LARAMIE AND GREEN RIVER GROUPS, WITH DISCUSSION OF SOME ASSOCIATED FORMS HERETOFORE KNOWN.

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[Extract from the Annual Report of the United States Geological Survey for 1882, by permission of the Director.]

Notwithstanding the large number of specific and generic forms of fossil mollusca that have been obtained from the Laramie and fresh-water Eocene groups of Western North America, every fresh examination of those deposits in any region in which they occur is sure to add something to our knowledge of the faunæ which respectively characterize them. While studying the Laramie Group in Northeastern Colorado during the season of 1881, I obtained no less than four new species, and extended the known geographical range of several others. Besides the new forms just mentioned I have recognized two others among collections made by other persons that have been in the National Museum for several years past. All of these new forms are described in the following paragraphs; and remarks are made upon other forms concerning which new facts have been discovered. These descriptions are also to appear in the Annual Report of the United States Geological Survey for 1882, in a "Review of the Non-Marine Fossil Mollusca of North America."

Genus UNIO Retzius.

Unio clinopisthus (sp. nov.), Plate III, figs. 1 and 2.

Shell transversely elongate, short in front of the beaks, elongate and narrowing behind them to the posterior end; basal margin having a gentle sinuosity, there being a slight emargination just behind the mid-length; front margin regularly rounded; dorsal margin proper rather short; postero-dorsal margin forming a long, convex, downward slope from the dorsal to the postero-basal margin, which latter margin is narrowly rounded; beaks depressed and placed near the front of the shell. A somewhat prominent, but not sharply defined, umbonal ridge extends from the beak of each valve to the postero-basal margin, giving a flattened space at the postero-dorsal portion of each valve. Surface marked only by concentric lines of growth.

Length, 63 millimeters; height, 30 millimeters; thickness, both valves together, 23 millimeters. (Museum No. 8359.)

Position and locality.—Strata of the Green River Eocene group near Washakie Station, in Southern Wyoming, where it was collected by Dr. Hayden.

Genus CORBICULA Mühlfeldt.

Corbicula berthoudi (sp. nov.), Plate IV, figs. 1, 2, and 3.

Shell very large, subtrigonal in marginal outline, moderately gibbous; front concave immediately in front of the breaks; front margin regu-

larly rounded; basal margin broadly rounded; postero-basal margin abruptly rounded up to the postero-dorsal margin, which latter margin slopes obliquely downward with a gentle convexity from between the beaks; hinge strong; all the teeth well developed, the lateral ones especially being long and large and crenulated upon their edges as is usual with all the known species of *Corbicula* of the Laramie Group; muscular and pallial impressions having the usual characteristics; surface marked with the usual concentric lines.

Length of one of the largest examples in the collections, 62 millimeters; height from base to umbo, 54 millimeters; thickness, both valves together, 44 millimeters.

This fine large species, the largest yet known in North America, has been found only in the Laramie strata east of the Rocky Mountains in Colorado. It is named in honor of Capt. E. L. Berthoud, the first discoverer of the rich shell deposits of the Laramie Group in that region. (Museum No. 11556.)

Position and locality.—Laramie Group; valley of South Platte River; Northeastern Colorado.

Corbicula augheyi (sp. nov.), Plate IV, figs. 4, 5, and 6.

Shell moderately large, subtetrahedral in marginal outline, postero-dorsal region not flattened, as in *C. berthoudi*; umbones full, rounded, considerably elevated above the hinge line, front regularly rounded; basal margin broadly convex; posterior end truncated, the direction of the truncated margin usually a little backward of a line drawn perpendicularly with the base of the shell; postero-dorsal margin a little convex; hinge well developed; muscular and pallial markings of the usual character; surface marked by the usual concentric line of growth, and usually by very faint umbonal ridges extending from the umbo to the postero-dorsal and postero-basal margins respectively.

Length of an adult example, 46 millimeters; height from base to umbones, 38 millimeters; thickness, both valves together, 30 millimeters.

This species has yet been found only in the valley of South Platte River, in Northern Colorado, east of the Rocky Mountains. It is named in honor of Prof. Samuel Aughey, of Nebraska State University, who assisted me in the collection of the type specimens. (Museum No. 11557.)

Position and locality.—Laramie Group; valley of South Platte River; Northeastern Colorado; associated with the preceding.

Genus NERITINA Lamarck.

Neritina bruneri (sp. nov.), Plate IV, figs. 7 and 8.

Shell subglobose; volutions about four; spire much depressed; suture moderately distinct; inner lip broad, its inner edge a little irregular. Surface of adult examples marked by numerous raised revolving lines, which are crossed by strong, dark, zigzag color-markings. Upon young

examples the revolving lines are absent, or nearly so, and the color-markings are less distinctly zigzag in their direction.

Axial length, 10 millimeters; transverse diameter, 13 millimeters.

The specific name is given in honor of Mr. Lawrence Bruner, who first discovered the species. It differs from *N. volvilineata* White, in being somewhat more globose, having a less elevated spire, and the inner lips broader and less retreating. It is marked by revolving lines, somewhat like that species, but they are sometimes obsolete. It is also ornamented by zigzag color-markings. The type specimen is represented by figs. 7 and 8 on Plate IV.

Associated with the foregoing is still another form, much smaller, which seems to be the young of *N. volvilineata*. It is without color-markings, and the inner border of the inner lip is dentate.

Position and locality.—Laramie Group; valley of South Platte River, Northeastern Colorado, where it is associated with the two last-described species.

Genus MELANOPSIS Lamarck.

Melanopsis americana (sp. nov.), Plate IV, figs. 9 and 10.

Shell very small, sides straight, and meeting at the apex at an acute angle; volutions six or seven, those of the spire not convex, but so flattened as to show only a linear suture between them, which is somewhat irregular; proximal portion of the last volution gently convex, its length being more than half the entire length of the shell; outer lip thin, not expanded, its margin not distinctly sinuous; inner lip having a very strong callus nearly filling the distal end of the aperture, leaving a narrow groove between it and the margin of the outer lip, and gradually diminishing in thickness towards the proximal end of the aperture; aperture, as bounded by the outer lip and callous inner lip, rudely subelliptical, angular at its distal end, rounded at its proximal end, and terminating at the end of the columella in a distinct, narrow canal, which is slightly bent to the left. Surface marked only by faint lines of growth.

Length, 7 millimeters; diameter of last volution, $3\frac{1}{2}$ millimeters. (Museum No. 11559.)

If we except the species which were published by Conrad under the generic name of *Bulliopsis*, but which probably belong to the genus *Melanopsis*, no species of the latter genus have hitherto been known in North America, either fossil or living. The species which is here described is plainly congeneric with the living *Melanopsis costellata* Ferrussac, and with the Eocene *M. buccinoidea* Ferrussac, both of Western Europe.

Position and locality.—Laramie Group, Valley of South Platte River, Northeastern Colorado, where it is associated with the three last described forms, and also with *Corbula*, *Melania*, *Anomia*, and *Ostrea*.

Genus CAMPELOMA Rafinesque.

Campeloma producta (sp. nov.), Plate III, figs. 7, 8, and 9.

Shell, elongate-ovate; test, moderately thick; spire, more than usually produced for a species of this genus; volutions, six or seven, usually slightly flattened, or having a faint revolving depression upon the distal side near the suture, which is more apparent upon the larger than the smaller volutions; suture, deep and abrupt upon the proximal side; aperture and lips having the usual characteristics of *Campeloma*; surface marked by the usual lines of growth, and by somewhat numerous revolving striæ which are often obscure. Among these examples are others which possess the general characteristics of those which are regarded as the types; but two or three of the revolving striæ upon the smaller volutions of these examples are much more prominent than in the case of typical examples. I at present, however, regard these as only varieties of a very variable species.

Length of an example regarded as typical, 32 millimeters; breadth of the last volution, 14 millimeters; but some examples, evidently referable to the typical forms, are proportionally less elongate. (Museum No. 8140.)

Position and locality.—Laramie strata in the Valley of Yellowstone River, Montana, where they were collected several years ago by Mr. J. A. Allen.

The under valve of ANOMIA MICRONEMA Meek.

It has been the subject of frequent remark that not a single example of the under valve of either of the two species of *Anomia*, *A. micronema* and *A. gryphorhynchus* Meek, both of the Laramie Group, has ever been discovered, although hundreds of examples of the upper valves of both of these species have been obtained, at many different localities, in a good state of preservation. I was lately so fortunate, however, as to find in the Laramie strata of Northeastern Colorado several examples of the under valve of *A. micronema*, one of which is illustrated by fig. 3, Plate III. That the under, or byssus-bearing, valves of *A. micronema* at least have been so generally destroyed is due to the fact, first, of their extreme thinness, and, secondly, to the fact that, with the exception of a thin, porcelanous layer in the middle portion, the whole valve is composed of a prismatic layer, like the shell of *Pinna*; the pearly layer, which gives such strength to the upper valve, being apparently entirely wanting in the lower. This prismatic layer breaks up into its component prisms with great facility. The characteristics of the under valve of *A. micronema*, as well as those of the upper valve, show it to be a true *Anomia*; thus presenting evidence of the great antiquity of the genus essentially as it exists to-day.

Both valves of recent species of *Anomia* have, as a covering to the pearly layer, a very thin prismatic layer, which is often obsolete. This layer is also sometimes distinguishable upon the upper valves of these

fossil species. The latter seem to differ from the shells of living species of *Anomia* only in the lack of development in the under valve of the pearly layer, and the excessive development of the prismatic layer.

PYRGULIFERA Meek and PARAMELANIA Smith.

There occurs somewhat abundantly in the Bear River Laramie beds of Southwestern Wyoming and the adjacent parts of Utah a shell which Mr. Meek first referred to *Melania*, but to which he afterward gave the new generic name of *Pyrgulifera*, describing it under the name of *Pyrgulifera humrosa*.* It is illustrated on Plate III, figs. 10, 11, and 12. Meek placed this shell among the Ceriphasiidae or American Melanians, but as it seems to differ quite as widely from the typical forms of that family as it does from the true Melanians, I have placed it provisionally with the latter family. It is the only known species of the genus which has been proposed to receive it, either fossil or living, if we except the two living forms which were described by Mr. Edgar A. Smith from Lake Tanganyiki, in Africa,† under the new sub-generic name *Paramelania*. Mr. Smith gave these two forms the names *P. damoni* and *P. crassigranulata*, respectively. Copies of his figures of both these forms are given on Plate III for comparison.

Paramelania, as represented both by these figures and Mr. Smith's description, seems to be exactly equivalent with *Pyrgulifera* Meek. It is true that we can never know whether the animal of the latter was generically the same as that of the former, and the wide chronological and geographical separation of the fossil and living forms is presumptive evidence against their generic identity. But if we are justified in establishing genera upon shells alone, as we must do in paleontology, we are entitled to hold them as against anything except direct proof of error.

EXPLANATION OF PLATE III

UNIO CLINOPISTHUS (sp. nov.).

- Fig. 1.—Left side view; natural size.
Fig. 2.—Dorsal view of the same example.

ANOMIA MICRONEMA Meek.

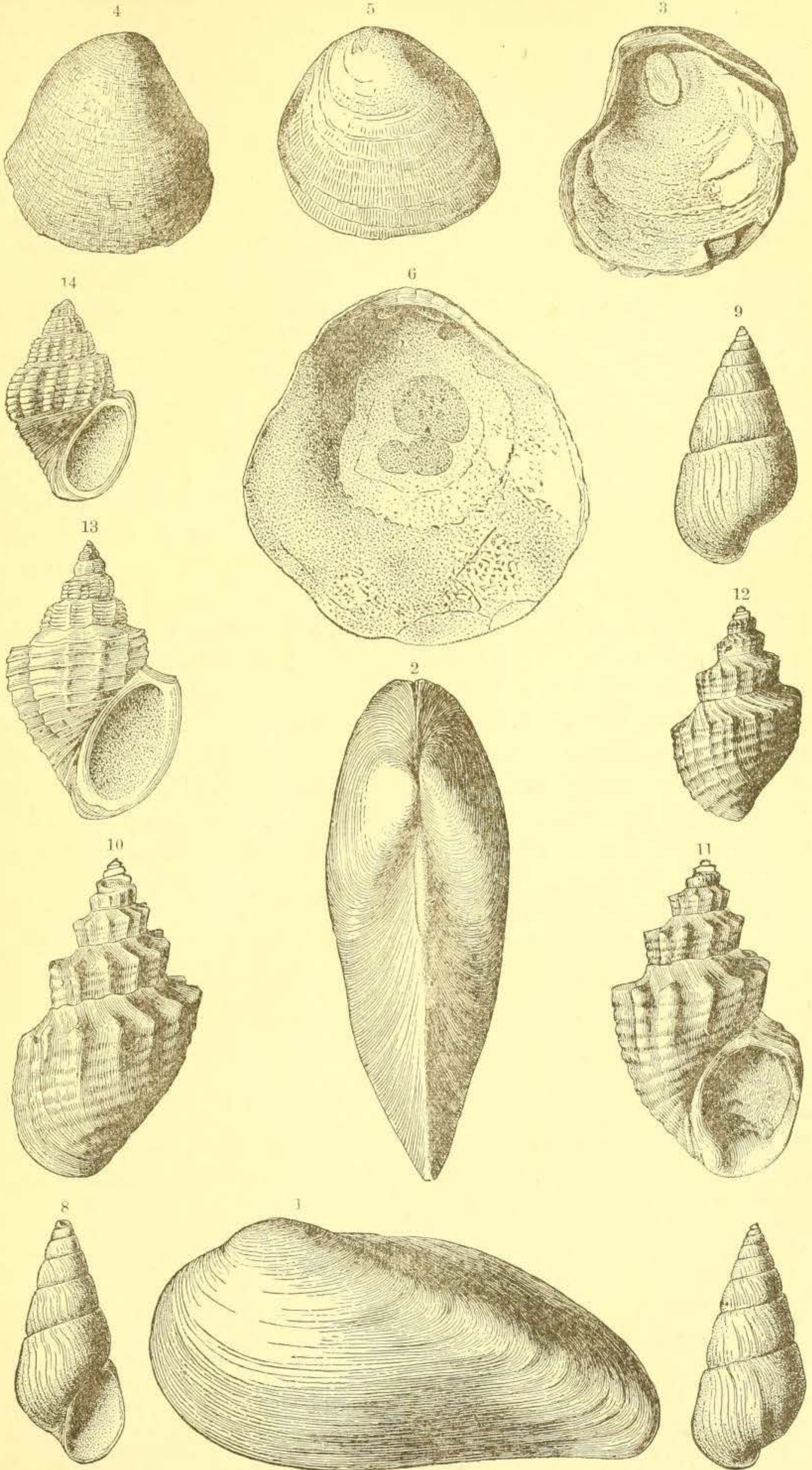
- Fig. 3.—View of the under valve, showing the byssal plug.
Fig. 4.—Exterior view of an upper valve.
Fig. 5.—Similar view of another example, showing coarser radiating lines.
Fig. 6.—Interior view of a very large upper valve, showing muscular scars and process beneath the umbo. All of natural size.

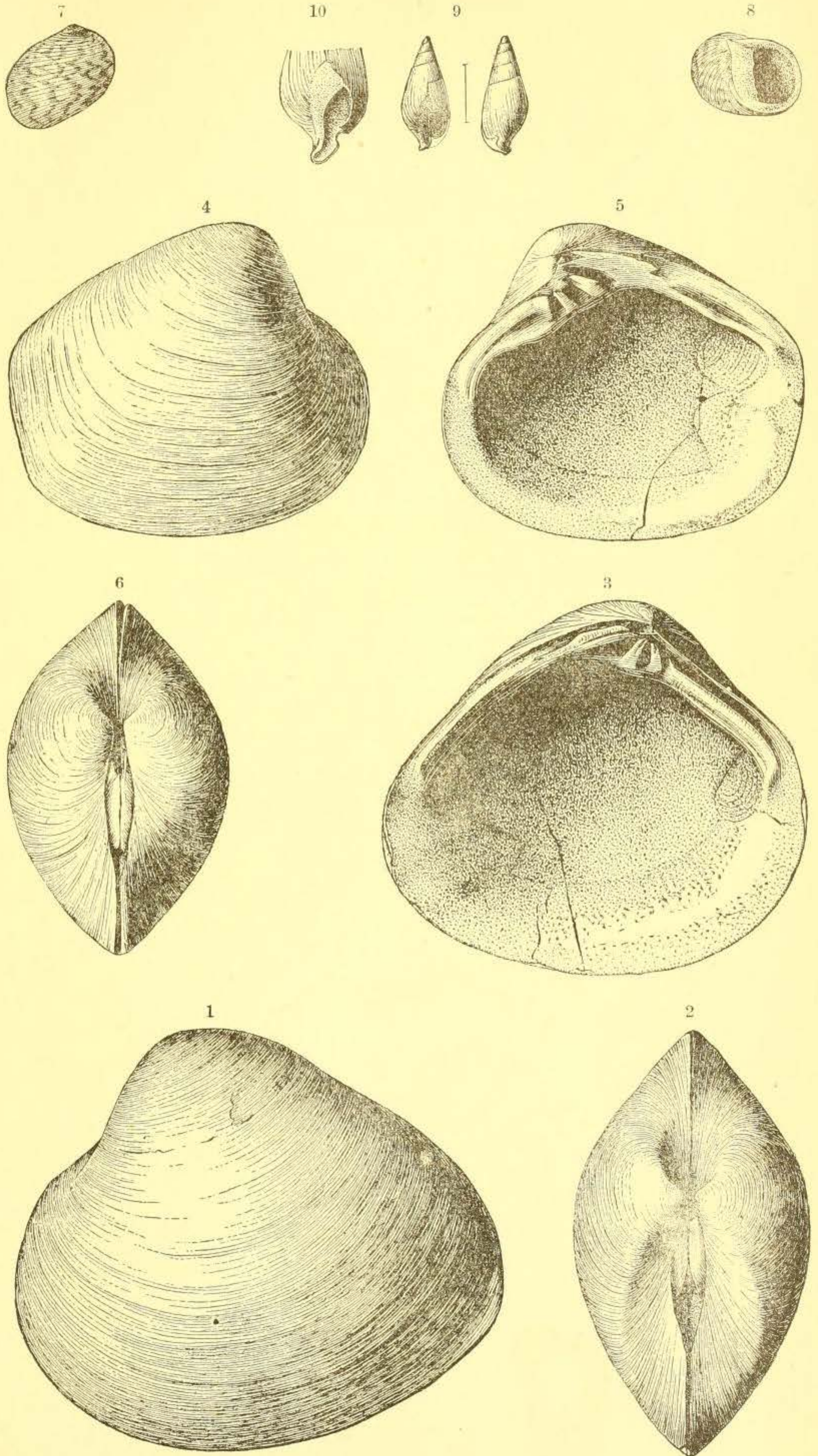
CAMPELOMA PRODUCTA (sp. nov.).

- Fig. 7.—Lateral view of type specimen; natural size.
Fig. 8.—Opposite view of the same.
Fig. 9.—Lateral view of a more robust example.

* For diagnosis of this genus, and description and figures of the species, see U. S. Geol. Sur. 40th Parallel, vol. iv, p. 146, pl. 17, fig. 19.

† See Proc. Zool. Soc. Lond. for May, 1881, pp. 558-561.





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