

Article IV.—NEW SPECIES OF UNIO FROM THE TERTIARY
ROCKS OF WYOMING.

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Among the rather numerous specimens of *Unio* (sens. latiss.) collected by the American Museum expeditions in Wyoming, I find material representing four apparently new species. Although the taxonomy of the Unionidæ, even with living species, is so difficult as to give rise to endless controversy, I have some confidence in the validity of the species now described. At the National Museum, thanks to the kindness of Dr. Dall, I have been able to study all the previously described Eocene (exclusive of Paleocene) Rocky Mountain species, with the exception of *U. rectoides* White. The Fort Union beds (Paleocene) contain a very rich and varied Unionid fauna, consisting of 23 known species, described by Whitfield, White and Meek. It is an astonishing fact that this fauna, in its most characteristic elements, disappears somewhere about the middle of the Fort Union (as understood by Knowlton¹), at about the same time as the dinosaurs. The dinosaurs have disappeared from the earth, but the Unionid fauna of the early Fort Union, in all its major features, survives in great abundance in the Mississippi Valley. In the Rocky Mountain region it has entirely gone, except that it has spread west to some extent in the rivers crossing the plains; this disappearance took place long ago, leaving in the Eocene only a few generic or subgeneric units, which eventually died out. Knowlton (Proc. Wash. Acad. Sci., XI, p. 232), discussing the possible reasons for the disappearance of the dinosaurs, concludes: "no more plausible theory occurs to the writer than that they were suddenly removed by epidemic disease, so many examples of which among recent animals have been given by Professor Osborn." This, obviously, will not explain the case of the Unionidæ, and we naturally think rather of movements of the earth, which drained the extensive waterways and produced conditions equally unfavorable to the Unionids and the dinosaurs. Knowlton, however, says "the waters were not drained; for sedimentation was continuous." It must be recalled that a very slight change of level would suffice to produce great changes in the water systems, and it certainly appears that the vast mass of

¹ It is not intended to express any particular opinion as to the lower limit of the Tertiary in using Knowlton's nomenclature. There appears to be no sharp line of demarcation between the Cretaceous and Tertiary in the Rocky Mountains, and since the limit thus becomes a matter for arbitrary decision, the question has no bearing on the biological argument.

sediment, much of it relatively coarse, indicates a regular orogenic movement. Should this be the real cause of the faunal change, we may ask ourselves whether the dinosaurs did not perhaps persist to a still later period in the lowlands eastward, where conditions have not been so favorable for the preservation of their remains?

Unio grangeri n. sp.

Shell very large, thick and inflated, rather coarsely sculptured with growth lines, but without nodules or ridges; anterior end obtusely rounded; dentition very heavy; muscle-scars deep; pallial line deep anteriorly. Represented by both valves, which are however much broken, with the posterior end missing. As preserved, the length is 140 mm.; it was doubtless originally not less than 180; depth about 95 mm., and width in middle about 85 mm. The lower anterior part of the shell is 10 mm. or more thick, but posteriorly the shell is thinner, about 3 mm. near the broken hind

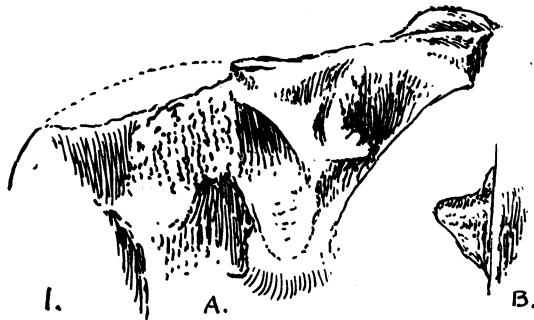


Fig. 1. *Unio grangeri* n. sp. A, Dentition of right valve, from within; B, same from above.

margin. The general outline is oblong, much as in *Lampilis ligamentina* (Lam.), but the swollen shell rather suggests *L. ventricosa* (Barnes). The umbones are not prominent (whatever sculpture they may have had is lost), and the dentition is of the *Lampilis* type, with a very large thick posterior pseudocardinal on the right valve. The impression of the anterior retractor pedis muscle is large (14 mm. long) and very deep. It is fully 10 mm. distant from the upper end of the pallial line.

Washakie, horizon B; Haystack Mts., Wyoming, north side, half way up, Sept. 20, 1906. (Paul Miller.) Named after Mr. Walter Granger, who has given us a good account of the Haystack Mtn. locality (Bull. Am. Mus. N. Hist., XXVI, pp. 13-23).

This is probably a *Lampilis*. Its great size and ventricose form readily distinguish it from previously described Tertiary Unionidæ of the Rocky Mountains.

***Unio eomargaron* n. sp.**

Shell elliptical, with the ends broadly rounded, the lower margin (except toward the ends) straight, the upper nearly so; beaks (no sculpture visible) not far from anterior end, little prominent; valves only moderately convex, little flattened posteriorly; growth lines distinct, but no other sculpture; shell only moderately thick, in some specimens brilliantly pearly-iridescent; dentition broad but not heavy (left valve), resembling that of *U. washakiensis* Meek. Length 60 mm., depth about 32.5, width about 22.

Eocene; head of Big Sand Coulee, in coarse friable greenish sandstone, in numbers (*W. Stein*, Sept. 8, 1912). Clark Fork Beds. They are also labelled "Ralston."

This is certainly allied to *U. washakiensis* Meek, but is a lighter shell, with the umbones rather more posterior, and the posterodorsal region less elevated. I examined *U. washakiensis* Meek in the U. S. National Museum,

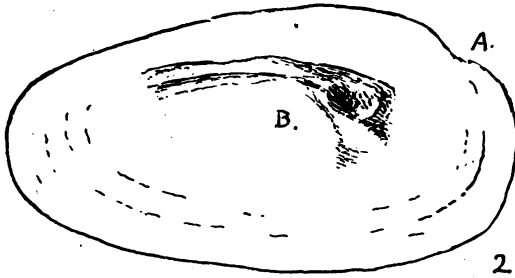


Fig. 2. *Unio eomargaron* n. sp. A, Outline of shell; B, dentition of left valve.

and noted as follows: "A large quantity of material, Wyoming and N. W. Colorado (near Raven Park and White River Valley). However the specimens from Washakie Station appears to me to be different from the rest; one of these (Washakie Sta., 18996) shows remnants of beak sculpture which was certainly plicate (undulate). The shell is very thick and deep, with heavy teeth; only the Washakie Sta. specimens show the hinge. All the other so-called *washakiensis* are longer, more parallel in outline, rather *U. clinopisthus*-like shells. They may be the same, but it seems doubtful. One young one (18677, eight miles below Green River Station) shows strongly plicate (undulate) beak sculpture. The Colorado specimens seem to be the same as this 18677, but they are all small, and apparently immature. It is not quite clear that the Washakie Sta. specimens are different from *U. haydeni*."

With regard to *U. haydeni* Meek, I noted as follows at the U. S. National Museum: "8869 (Cotypes); near Fort Bridger, Wyo.; deep, flattish species,

rather reminding one of *U. littoralis*; no beak-sculpture visible. 699 includes a broader (wider) specimen. 18695 is a great lot of *haydeni* from near Fort Bridger; it keeps the characters well, except that some are wider. Striation quite coarse."

The sketches I made show that the species is unusually flattened, or when broader has the posterior end flattened, so that the outline, seen from above, is unlike that of *U. eomargaron*. The straight (oblique) posterior slope is also quite unlike that of *U. eomargaron*. The straight lower edge separates the new species from *U. rectoides* and *U. shoshonensis*. *Unio shoshonensis* White, at least as represented in the National Museum from Henry's Fork, is a quite thick, deep species, with the umbones strongly undulate-plicate, with double loop in *U. mendax* style, the anterior part of loop largest. The dentition is not quite like that of *washakiensis*.

Some *shoshonensis* (det. Marcou, apparently correctly) are from the Green River Group, Dry Mts., N. W. Colorado (13223).¹ These have the shell 4 mm. thick. *U. shoshonensis* is less compressed posteriorly than *haydeni*, it is in fact quite a ventricose species.

Unio didymictidis n. sp.

Shell oblong, the outline almost as in *Lampsilis ligamentina*, except that the shell is not so deep posteriorly, and the lower margin consequently is not oblique; denti-

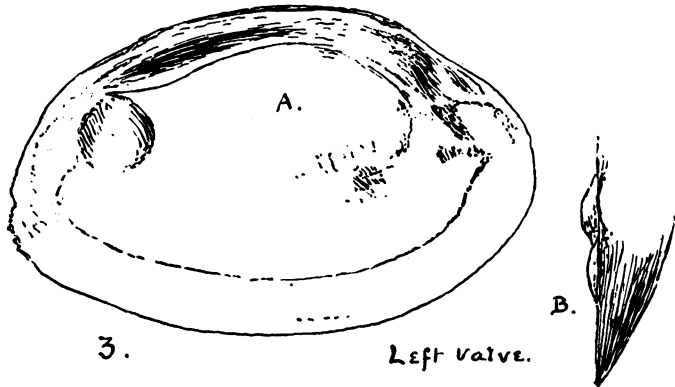


Fig. 3. *Unio didymictidis* n. sp. A, Left valve, from within; B, anterior end, from above.

tion heavy, the posterior pseudocardinal thick and obtuse (evidently somewhat worn); umbones not at all prominent, too worn to show sculpture; shell thick,

¹ Shells labelled *U. clinopisthus* White (det. Marcou), from Green R. Group, near Raven Park, Colorado (8876) are not that species, but are probably *haydeni*, so far as the poor material shows. A lot of shells from Henry's Fork are genuine *clinopisthus*.

growth-lines distinct, but no ridges or nodules. Length 69.5 mm.; height 44; breadth about 27 mm.; length of hinge-lamellæ about 28 mm.; level of umbones (vertically) from level of anterior margin about 21 mm.; anterior end of pallial line from margin of shell 8.25, from anterior retractor pedis 4 mm.; width of scar of posterior adductor 10.5 mm. Seen from above, the lateral outline of the anterior end of the shell is entirely convex, without the flattening due to compression which is conspicuous in *U. sinopæ*.

Wasatch Eocene, Gray Bull beds; north side of Dorsey Creek, nine miles from St. Joe, Big Horn Basin, Wyo. (*G. Olsen*, October 1, 1911). Found with a quantity of *U. wasatchensis*, from which it is readily known by the thick shell and heavy dentition. The umbones are less prominent than in *U. shoshonensis*, but the dorsal margin is convex as in that species.

Unio sinopæ n. sp.

Shell thick, with very heavy, broad dentition; growth lines strong, but no nodules or ridges; umbones too worn to show any sculpture; anterior end compressed, so that when seen from above the anterior lateral outline is slightly concave

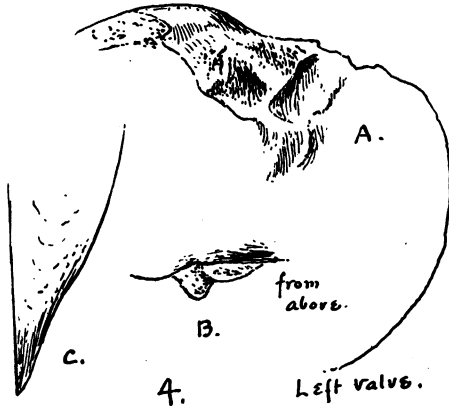


Fig. 4. *Unio sinopæ* n. sp. A, Dentition of left valve, from within; B, same from above; C, anterior end, from above.

a short distance behind the margin. Umbones about 35 mm. from anterior margin; pallial line weak, its anterior end 14 mm. from margin; anterior margin broadly rounded. The shell is represented only by the anterior and middle parts, but it evidently was over 100 mm. long and somewhat over 50 deep. The dentition (left valve), with a large subquadrate fossa between the pseudocardinals, is quite distinctive.

Wasatch Eocene; North side Dorsey Creek, 9 miles from St. Joe, Big Horn Basin, Wyo. (*G. Olsen*, October 1, 1911). Gray Bull beds. Found with *U. wasatchensis*.

Unio leanus Meek.

I take occasion to note that this name is not really preoccupied, the recent species being *U. leai*. Consequently the name *U. meekii* White is not required. I have examined cotype material in the National Museum, from Church Buttes, Wyoming. It is a heavy species with large teeth, represented by five internal casts and one fragmentary shell, which is very thick. The sculpture cannot be made out.

A species represented by casts in bright green rock from the Bridger Beds at Fort Bridger, Wyo. (Amer. Mus. N. H. Exp., 1893) may be compared with *U. leanus*, but is evidently distinct. It is not in a condition for description.