

Article XV.—NOTICE OF SIX NEW SPECIES OF UNIOS
FROM THE LARAMIE GROUP.

By R. P. WHITFIELD.

PLATES XXXVIII-XL.

Among the collections brought in from the western portion of the country during the past season (1902), by Mr. Barnum Brown, there was a considerable amount of material from the Laramie group in Montana and adjoining territory. Most of this material was from a locality known as Snow Creek, on the Missouri River, about 130 miles northwest of Miles City, Montana, from a bed which was estimated by Mr. Brown as being 120 feet above the Pierre Shales. The fossils found here consist largely of Unios and other fresh-water forms, most of which are well known Laramie fossils; but among them there are a few Unios that are not recognizable as belonging to known species. They are pretty well defined forms, and it has been thought desirable to publish them as new, together with a list of the recognized species which accompany them. The fossils were found imbedded in a fine-grained gray clay, and are extremely friable and difficult of extraction, so much so, that it has been nearly impossible to free any of them from the matrix without an almost complete exfoliation and breaking up of the shell; only a few of them are sufficiently well preserved and perfect enough for illustration.

The following six species have been with difficulty illustrated by photography, so as to leave little or no doubt of their specific characters.

Unio æsopiformis, n. sp.

PLATE XXXVIII, FIGS. 1-5.

Shell of medium size, transversely ovate, largest at a point opposite the beaks, which are situated pretty well forward. Shell surface marked by a line of strong nodes extending from the beaks to the base of the shell behind the middle of the length, also by a slight sulcus just behind the line of nodes. Posterior cardinal slope somewhat

abrupt, forming an angular ridge along the umbonal slope from the beak backward, dying out behind the middle length. Sometimes a second faint ridge is seen between this and the border of the shell. Internally, the left valve, when not water-worn, has strong prominent cardinal teeth, and very prominent laterals with a deep groove, and the crest of the principal ridge is slightly crenulated. Muscular imprints deep and rugose. Pallial line strongly marked.

This species is very closely related to *Unio æsopus* Green in its general features, and even in the internal characters. But the oblique sulcus behind the line of nodes is not nearly so marked, and the nodes themselves are single bulgings of the shell substance, and do not have that flowing droplike feature of protrusion characteristic of the nodes of that species; nor does *U. æsopus* possess the angular carinations of the cardinal border possessed by this. Its extremely close resemblance to that species has suggested the new specific name, for the purpose of designating its probable relationship.

There are two distinct forms of the species recognized in the series; perhaps representing sexual differences. The second form is much narrower between the hinge and basal margin, and has a somewhat more distinct sulcus.

***Unio verrucosiformis*, n. sp.**

PLATE XL, FIG. 10.

Shell of nearly medium size, circular in outline, compressed-convex or subdiscoid on the surface, marked with a line of obtuse nodes from the nearly central beak to the basal margin, each node giving origin to a strong ridge passing obliquely downward and backward to the posterior margin, very nearly at an angle of forty-five degrees. Anterior half of the shell smooth or marked only by coarse lines of growth.

The species is represented only by a single imperfect right valve, the interior of which is so badly preserved as to be useless for illustration. The cardinal teeth, however, show evidence of having been very strong, the muscular imprints deep, and the pallial line anteriorly very strongly marked, as the shell has been quite thick.

This species has much the general features of *U. verrucosa* Barnes (= *U. pustulosa* Lea ?), but is more nearly circular;

more extended in front, not at all alate behind, with the pustules and pustulose ridges entirely different.

***Unio retusoides*, n. sp.**

PLATE XXXVIII, FIGS. 6 AND 7; PLATE XL, FIGS. 1 AND 2.

Shell quite small, obliquely circular or vertically ovate, strongly inflated, with strongly corrugated beaks directed forward. A comparatively strong, deep sulcus passes from the beaks along the posterior margin from behind the beaks to the posterior basal border, forming a strong emargination or constriction above the postero-basal angle. Surface of the shell smooth, except in the region of the corrugated beaks. Corrugations of the beaks proportionally deep, forming a series of V-shaped ridges. Interior of the valves marked by extremely strong, prominent, cardinal and lateral teeth, and deeply-marked muscular imprints. Cardinal tooth in the right valve divided into two or three parts by deep gashes. Lateral teeth strongly curved and directed downward at an acute angle.

The close resemblance between this little shell and *U. retusa* Lam. as it occurs in the rivers of the West, is truly remarkable, and shows the persistence of the features of these fresh-water types through the vicissitudes of the many geological changes of the region bordering the waters of their habitations. The features of this, and the two foregoing species, are remarkable instances of this retention of character. The only noticeable difference between this species and *U. retusa* Lam. is the absence of the corrugations on the beaks of the recent shells.

***Unio browni*, n. sp.**

PLATE XXXVIII, FIGS. 8 AND 9.

Shell rather below medium size, subtriangular in general outline, with a moderately sharply elevated and strong beak; much and deeply corrugated on the upper portions and anterior side, and apical portion of the cardinal slope. Cardinal margin abruptly declining, in fact vertical to the plane of the valve, and sharply angular on the ridge from the beak to the posterior basal angle; from which point the margin of the shell is strongly rounded throughout the base and anterior end. Surface of the shell, from the base of the apical corrugations over the entire surface, smooth, except the ordinary lines of growth which are gathered into irregular varices. Corrugations on the apical portions of the shell disc very strong and deep, forming a

series of V-shaped ridges which retain on each arm of the V faint traces of the opposite set, producing a wavy surface to the ridges like the crossing of opposite lines of waves on water. On the anterior side of the beak, and on the posterior slope, the corrugations are finer and more irregular.

In the interior, the left valve is strongly marked. It possesses a very prominent cardinal tooth which is divided longitudinally by three slight gashes, and many corrugations. Lateral tooth moderately prominent and finely corrugated vertically. Muscular scars large and deep.

The most prominent feature of this species is its triangular form and strongly corrugated umbo. The nearest described Laramie species is *Unio holmesiana* White, from which it differs materially in wanting the posterior ridges of that shell, and in the entirely different structure of the corrugations on the umbones. The nearest allied living species among the American Unios is perhaps *U. securis* Lea, to which it can be said to bear only a distant resemblance, differing from that in many respects, but most strongly in the deeply marked corrugations of the apical portion.

Named in honor of Mr. Barnum Brown of the Museum corps, who collected the entire series.

Unio percorrugata, n. sp.

PLATE XL, FIGS. 3-9.

Shell small, quadrate, attaining a transverse diameter of only one and one eighth inch in the largest and oldest appearing individuals in the collection, which are excessively thickened. In the young stages of the shells, the form is very slightly transverse, but decidedly quadrangular. In the middle and aged condition, they are still quadrangular, but less transverse, that is, height and width are more nearly equal. The surface in the young stage is very strongly corrugated, the corrugations extending over fully one half of the disc, and very deep; while the front half of the shell is smooth, or marked only by the growth lines.

The interior has strong prominent cardinal teeth and deep sockets. The lateral teeth strongly bent and somewhat curved. Muscular imprints strong and deep. In the young shell the lateral teeth are more slender and nearly at right angles to the height of the valve, or parallel to the cardinal margin. In the older specimens the cardinal tooth of the left valve is much cut up and intersected.

The quadrangular form and the strongly corrugated beak, which seldom disappears, even on old water-worn examples, will serve as distinguishing marks of the species.

***Unio postbiplicata*, n. sp.**

PLATE XXXIX, FIGS. I-II.

Shell below medium size, transversely elliptical or subovate, with small obscure beaks situated at, or a little less than one fourth of the shell's length from, the anterior extremity. Valves moderately convex with the beaks and cardinal margin somewhat enrolled so as to give a somewhat cylindrical form to the shell when the valves are in contact. General surface of the shell smooth, with but moderately-marked growth lines. On the enrolled beaks, the surface is distinctly undulated for some distance back from the hinge line, and the posterior cardinal slope on each valve is marked by two distinct diverging ridges, extending from the point of the beaks along the posterior umbonal region to a greater or less distance toward the postero-cardinal border; but often becoming obsolete at some distance between these points.

In the interior the shells are much thickened and often excessively heavy. The teeth are strong and prominent, and the muscular imprints deep and well marked, the cardinal tooth strongly striated and the laterals curved and slightly striated vertically.

The distinguishing features of the shell consist of the undulations of the beaks and the two diverging ridges on the posterior cardinal slope of each valve. I cannot find any described Laramie form of *Unio* that will require comparison with this species.

The species of Laramie fossils identified from the material brought from Snow Creek and associated with the forms described in the foregoing pages are as follows:

<i>Unio aldrichi</i> White.	<i>Campeloma multilineata</i> M. & H.
" <i>danae</i> M. & H.	" <i>vetula</i> M. & H.
" <i>holmesiana</i> White.	" <i>producta</i> White.
" <i>vetusta</i> Meek.	<i>Cassiopella turricula</i> White.
" <i>cryptorhynchus</i> White.	<i>Vivipara plicapressa</i> White.
<i>Sphaerium planum</i> M. & H.	<i>Thaumastus limnaeiformis</i> White.
<i>Corbicula subelliptica</i> M. & H.	<i>Bulinus rhomboideus</i> M. & H.

Several as yet undeterminable forms of *Unios* and other shells are in the collection.

EXPLANATION OF PLATE XXXVIII.

Unio æsopiformis Whitf., page 483.

- FIG. 1.—Left side view of a slightly crushed specimen.
FIG. 2.—Cardinal view of the same specimen as Fig. 1.
FIG. 3.—Outside view of an imperfect left valve.
FIG. 4.—Interior of the same.
FIG. 5.—Interior of a left valve of the narrow form of the species.

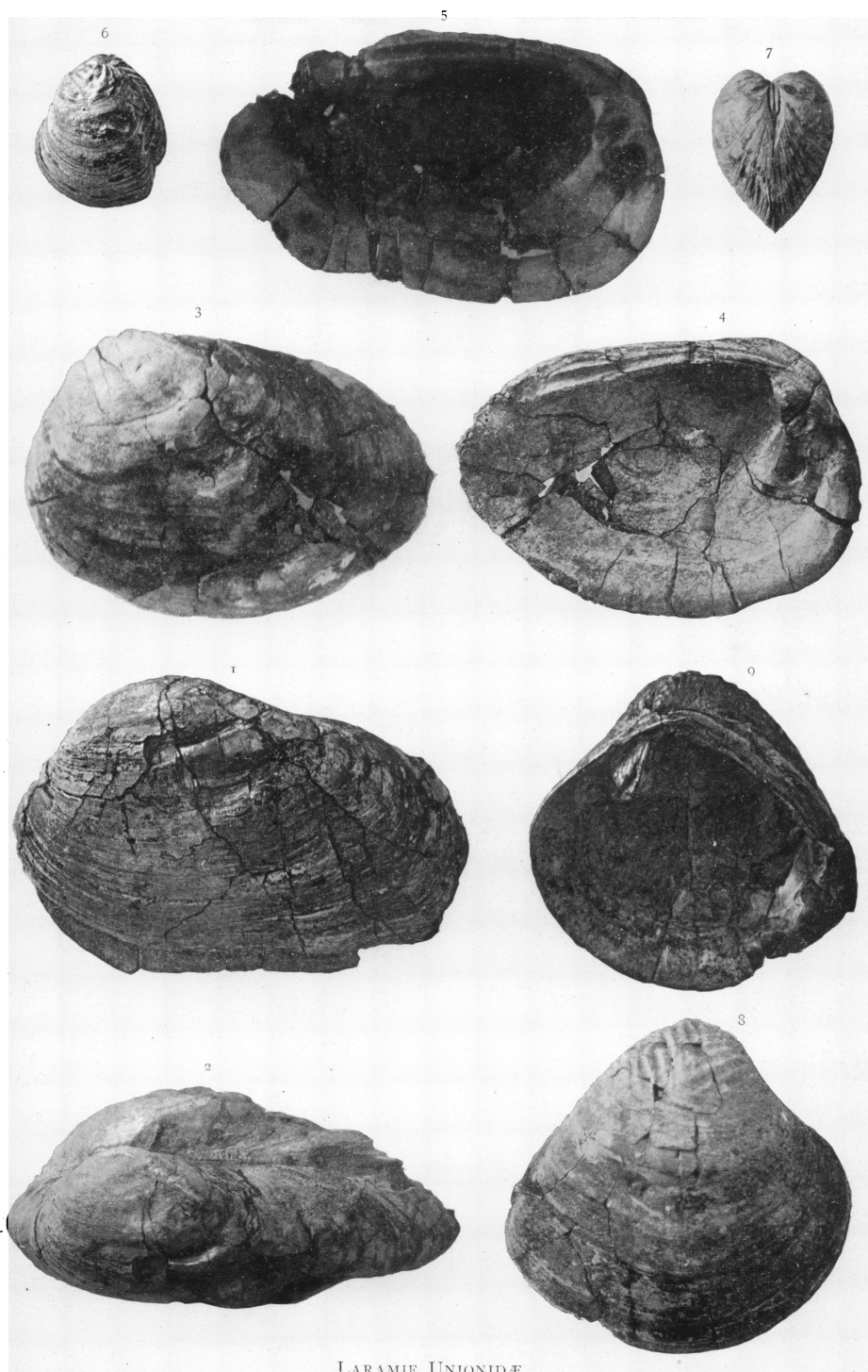
Unio retusoides Whitf., page 485.

- FIG. 6.—Left side view of a very perfect specimen.
FIG. 7.—Posterior cardinal view of the same.

Unio browni Whitf., page 485.

- FIG. 8.—Exterior view of the type specimen.
FIG. 9.—Interior of the same.

All figures natural size, and all from photographs.



LARAMIE UNIONIDÆ.

EXPLANATION OF PLATE XXXIX.

***Unio postbiplicata* Whitf., page 487.**

FIGS. 1 and 2.—Exteriors of a right and a left valve of the usual form of the species.

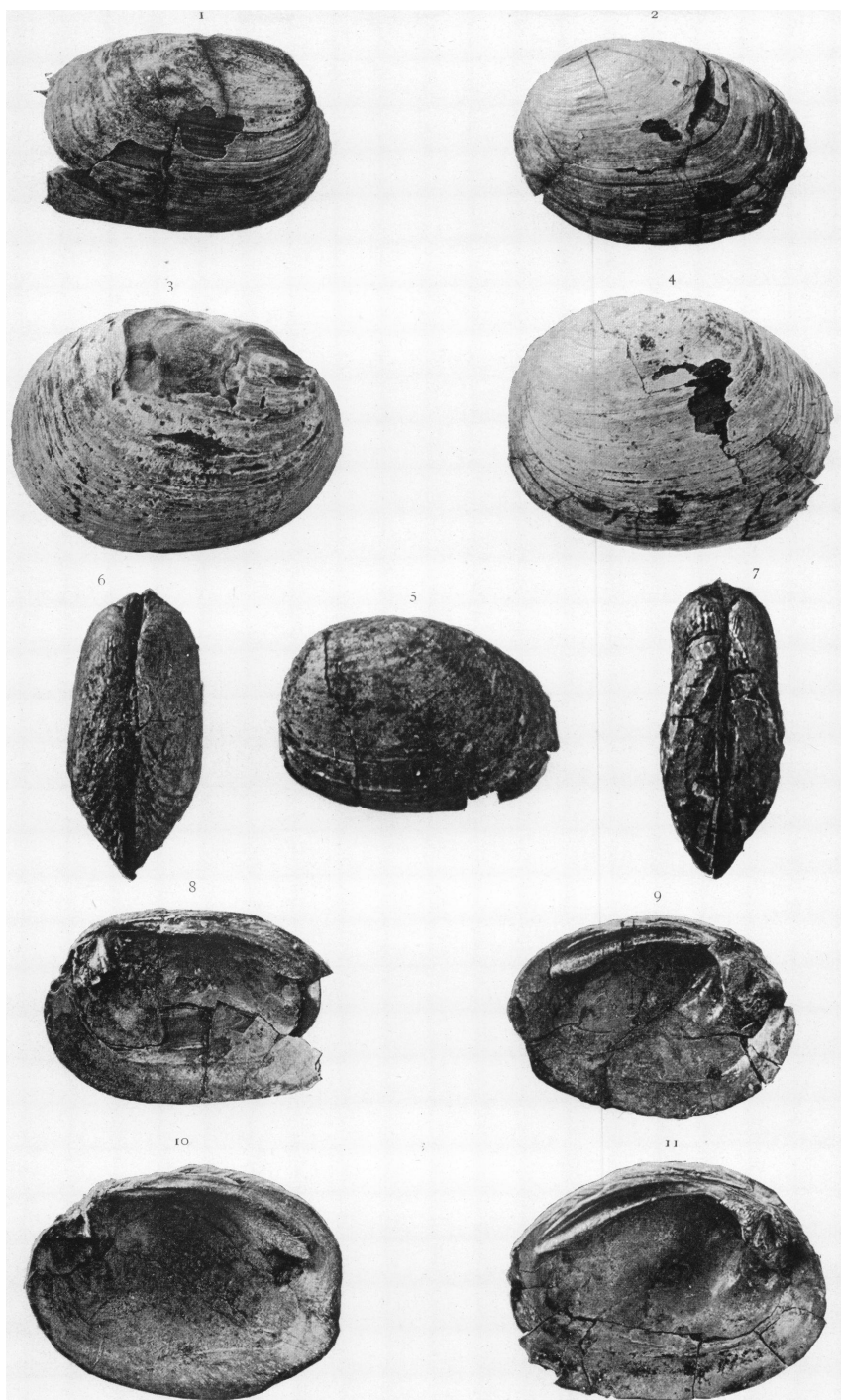
FIGS. 3 and 4.—Views of a right and a left valve, old and thickened, the former much eroded at the beak.

FIG. 5.—Exterior of a thinner left valve.

FIGS. 6 and 7.—Cardinal profile views, to show the undulations on the beaks, and the two diverging plications on the posterior umbonal slope.

FIGS. 8-11.—Interior views of the specimens, figures 1-4.

All figures natural size, and all from photographs.



LARAMIE UNIONIDÆ.

EXPLANATION OF PLATE XL.

***Unio retusoides* Whitf., page 485.**

FIGS. 1 and 2.—Interior of a right and a left valve, showing the large cardinal tooth and the curved lateral.

***Unio percorrugata* Whitf., page 486.**

FIGS. 3 and 4.—Exterior views of two young shells, showing the strongly corrugated beaks.

FIGS. 5 and 6.—Two views of a larger shell presenting adult features.

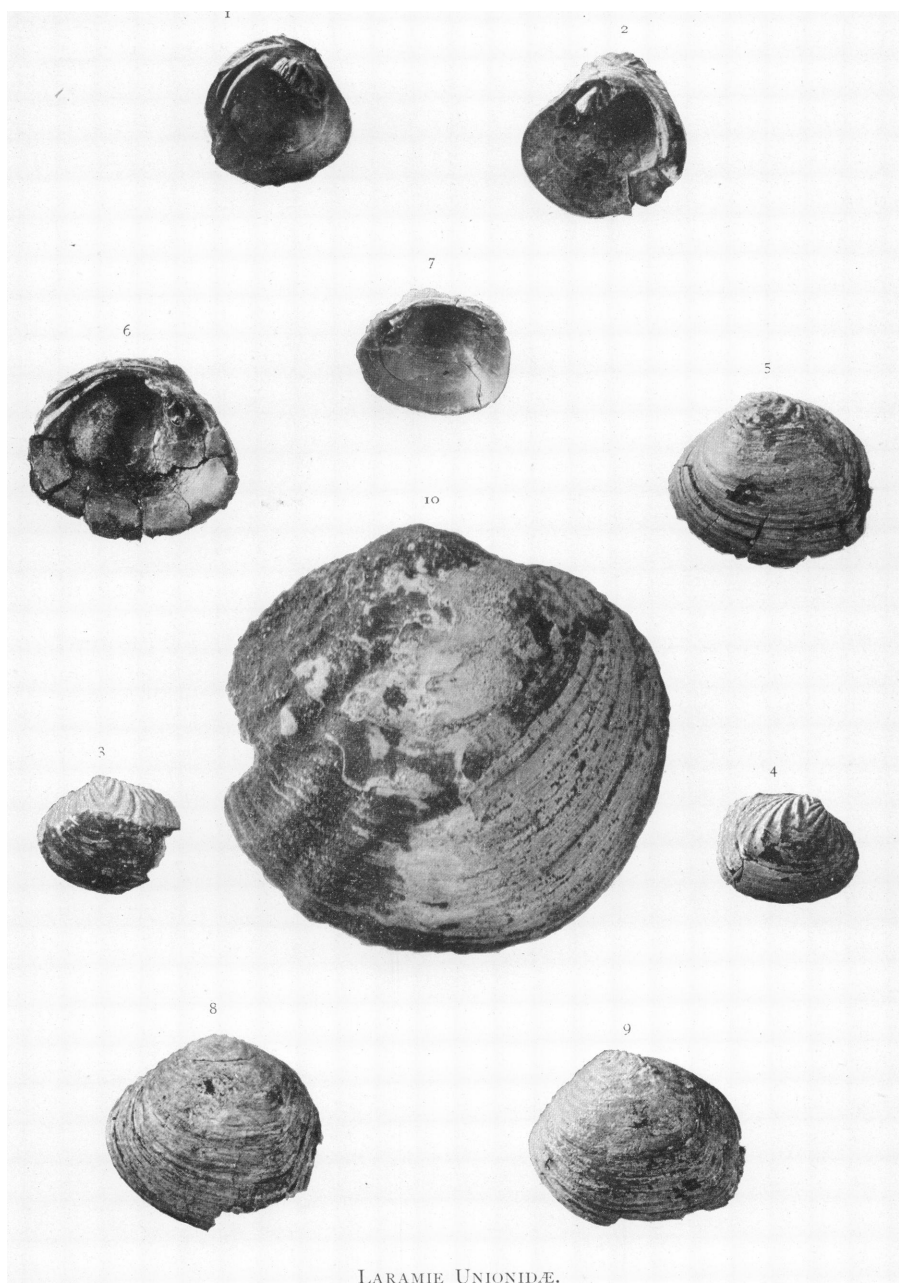
FIG. 7.—Interior of the specimen, Fig. 4.

FIGS. 8 and 9.—Exterior of two, old thickened and probably water-worn left valves.

***Unio verrucosiformis* Whitf., page 484.**

FIG. 10.—Exterior view of the specimen which is a right valve.

All figures natural size, and all from photographs.



LARAMIE UNIONIDE.

