

ART. XLVI.—*Two New Fresh-water Gastropods from the Mesozoic of Arizona*; by W. I. ROBINSON.*

IN the summer of 1914, Professor H. E. Gregory of Yale University collected an abundance of fresh-water gastropods in northeastern Arizona. They are pseudomorphs of SiO_2 , but occasionally preserving patches of the external surface markings. They vary much in size and proportions, but are all referable to two species, *Valvata gregorii*, sp. nov., and *Limnea hopii*, sp. nov. The former species was also collected by Professor Gregory in 1913 from the "Painted Desert beds," chiefly Jurassic, about four miles northeast of Black Falls, Arizona. Both species are closely allied to forms described by C. A. White,† from beds now referred to the Morrison formation and assigned by him to the Jurassic.

In the collection of 1914, Professor Gregory also found a number of *Unio* fragments, apparently in the top of the Triassic of the Moenkopi Valley about six miles below the bridge on the Tuba-Flagstaff road. They are too fragmentary for specific determination, but Doctor T. W. Stanton, of Washington, D. C., to whom the fossils were submitted for confirmation of my work, states that they resemble *Unio cristonensis* Meek, a Triassic form.

Valvata gregorii, sp. nov. (Fig. 1, *d* and *e*.)

Shell sub-globose: from two to three evenly rounded whorls; the first two raised in a low spire, the last increasing rapidly in size and coiling obliquely to the planes of the other two. Umbilicus small, but well-defined. Peristome entire; inner lip somewhat reflexed. Interior surface with transverse growth lines. Exterior showing in rare cases several longitudinal ridges and grooves. Size and proportions variable.

Smallest specimen,	height	4 mm,	width	6mm
Medium	"	"	10.5 "	" 11 "
Largest	"	"	16.5 "	" 18 "

This species resembles *Valvata scabrida* Meek and Hayden,‡ but differs from it in having fewer whorls, and a different manner of coiling.

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† White, C. A., On the Fresh-water Invertebrates of the North American Jurassic, Bull. U. S. Geol. Surv., No. 29, 1886.

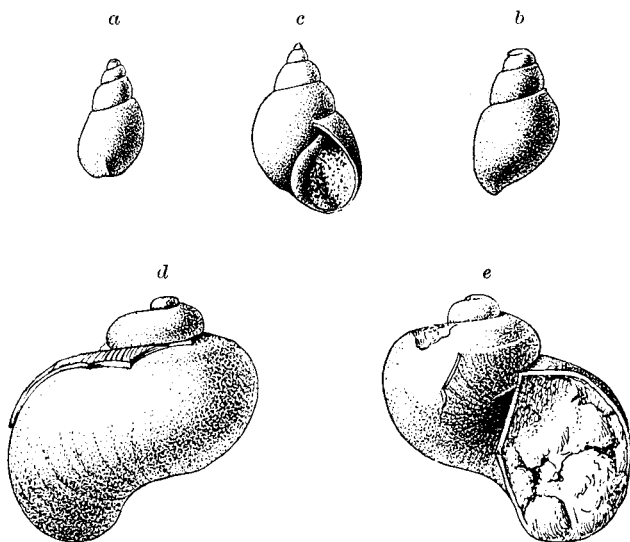
‡ Paleontology of the Upper Missouri, p. 113, pl. iv, figs. 2a, 2b, 1865.

Found in the "Painted Desert beds" of northeastern Arizona. The species is named after Professor Gregory, who collected the specimens.

Limnea hopii, sp. nov. (Fig. 1, *a*, *b* and *c*.)

Shell small, with moderately high spire. Whorls three to five, the last ventricose and having a height equal to that of

FIG. 1.



the others combined. Aperture sub-oval. External surface not seen. Size and proportions variable.

Smallest specimen,	height	5 ^{mm} ,	width,	3.5 ^{mm}
Medium	"	"	9 "	5.5 "
Largest	"	"	12 "	8.0 "

These shells closely resemble *L. ativuncula* White,* but differ from it in having fewer whorls and in being broader proportionately. The spire of *L. ativuncula* is slightly more attenuated than that of *L. hopii*.

Found in the "Painted Desert beds" of northeastern Arizona. Specific name after an Arizona tribe of Indians.

Both *Limnea* and *Valvata* are represented by numerous species from the late Mesozoic to Recent time. As no undoubted

* White, C. A., op. cit., p. 20, pl. iv, figs. 10 and 11.

representative of these genera has been found in beds earlier than late Jurassic, and as the two species described above are closely related to late Mesozoic species, the fossil evidence indicates that the time of the deposition of the new forms was Jurassic and probably middle or late Jurassic. A discussion of the stratigraphy of these beds will be published by Professor H. E. Gregory for the United States Geological Survey.

EXPLANATION OF FIGURES.

- FIG. 1 *a-c*. *Limnea hopii*, sp. nov.
a and *b*. Two individuals differing slightly in outline from the type specimen (*c*), twice natural size.
c. Apertural view of the holotype, three times natural size.
FIG. 1 *d* and *e*. *Valvata gregorii*, sp. nov. Two views of the holotype, twice natural size.