56.4(118:73W)

Article XX.— MOLLUSCA FROM THE TERTIARY STRATA OF THE WEST.

By T. D. A. Cockerell and Junius Henderson.

Plates XXI and XXII.

The American Museum of Natural History has in the course of a number of years brought together a small but important collection of land and freshwater mollusca from the mammal-bearing horizons of the western States. These materials have been secured incidentally while searching for vertebrate remains, and it is probable that they do not adequately represent the Molluscan faunæ of the several localities, the smaller species especially having been frequently overlooked. Nevertheless, considering the very scanty knowledge we possess of the Tertiary land and freshwater mollusca of North America, and the fine species now added to the short list, the collection must be considered a very valuable one; especially since the species come from horizons the precise relative age of which is known. We are greatly indebted to Dr. W. D. Matthew for the opportunity to study and describe the collection.

LAND MOLLUSCA.

Basal Eocene.

Helix nacimientensis *White.*

Plate XXI, Figs. 3, 4.

Helix nacimientensis White, Bull. 34, U. S. Geol. Surv. (1886), p. 26; pl. 5, figs. 3–5.

Lysinoë nacimientensis (White) Cockerell, Bull. Amer. Mus. N. Hist., XXVII (1906), p. 459.

Numerous young, and three adults, collected in the Torrejon beds, Rio Torrejon, seventy miles west of Nacimiento, New Mexico (*Brown*, 1896). This species was described from the Puerco, at a time when the Torrejon had not been given a separate name. Probably all the Puerco mollusca recorded by White in the Bulletin cited come from the Torrejon.

Young specimens show the sculpture of the upper whorls, consisting of rather coarse oblique lines of growth. In some shells there is an appearance of spiral grooving, but this is certainly due to weathering. Very young

shells, less than 8 mm. diameter, have a sharp keel. Adults vary considerably in form, some being higher and more compact than others; it is possible that the flatter and broader ones represent a second species, but we believe not. Pilsbry (Manual of Conchology, part 58, p. 68) remarks that this species is "apparently referable to the Mexican genus *Lysinoë*, judging by the size, the circumumbilical angle, etc." There is a superficial resemblance to *Helix spatiosa* Meek & Hayden, from the Lower Eocene, but the latter has rounded whorls and a wider umbilicus.

With the *H. nacimientensis* is a single specimen of another species, crushed and very imperfect. It seems too large for *H. adipis* White, and so far as can be seen does not differ from *H. riparia* White, described from the Green River Eocene. It probably represents an undescribed species, which if complete would be found to differ from *H. riparia.*

LOWER EOCENE.

Oreohelix megarche sp. nov.

Plate XXII, Figs. 4–6.

Shell depressed, the spire broadly subconical; whorls about 5¼, flattened above and below, the last whorl with the periphery obtuse, broadly rounded, but the earlier ones angular, a strong keel extending as far as the fourth; sutures rather prominent; umbilicus widely open, with a diameter of about 10 mm.; aperture apparently as usual in *Oreohelix*, but not perfectly preserved in any of the specimens. Embryo (about two whorls) with strong, regular, close oblique ribs, following the lines of growth, about eight in one mm.; rest of shell rather coarsely obliquely strigose, the sculpture more or less irregular, the ribs increasing in size on the later whorls, where they are moderately sharp, about ten in five mm., but not distinct or even enough to count accurately. Diameter, max. 41, min. 35 mm.; alt. about 23 mm.; spire 10 mm. or considerably less.

Locality.— Wasatch beds, Big Horn Basin, Wyoming, five specimens. The type and three others were collected three miles southeast of Otto (*W. S.*, Aug. 14, 1910).

This very fine species is larger than any living *Oreohelix*, but in spite of its great antiquity, we feel confident in referring it to that genus. The sculpture and form agree exactly, and in particular the very characteristic sculpture of the embryonic whorls reproduces accurately the condition found in such species as *O. chiricahuana* Pilsbry from Arizona. The spiral sulcus or depression above the suture, characteristic of the upper whorls of *Oreohelix*, is distinctly visible.

Oreohelix grangeri sp. nov.

Plate XXI, Figs. 5–9.

Shell depressed, the specimens crushed, but apparently originally at least as flat as *O. elrodi* Pilsbry; whorls about 4⅓ (probably not quite adult); periphery very sharply keeled; surface coarsely obliquely irregularly strigose; embryo shell with regular fine sharp ribs as in other species, about 12 in a mm.; no distinct spiral lines, above or below. Max. diam. about 21 mm.

Locality.— Ralston Beds; Lower Eocene of Big Horn Basin, Wyoming (*Sinclair and Granger*). Three specimens.

This is very like *O. elrodi* Pilsbry, but the nuclear whorls are more convex, with finer sculpture, and without the depressed line above the suture. With regard to the general sculpture of the shell, the fossil may be compared more closely with *O. chiricahuana percarinata* P. & F., which only seems to differ in the more evident traces of spiral lines.

Gastrodonta (?) **evanstonensis** (*White*).

Helix evanstonensis WHITE, Bull. U. S. Geol. & Geog. Surv. Terr., IV, 1878, p. 714.

Described from the Evanston beds, supposed at the time to be Laramie Cretaceous, but now considered to be Eocene.

Gastrodonta (?) **evanstonensis** var. **sinclairi** v. nov. *Cockerell.*

Plate XXI, Figs. 1, 2.

Alt. nearly 9 mm., diam. 9 mm. Differs from the typical form by the more elevated spire. Whorls six; base flattened; last whorl obliquely striate. Apparently a *Gastrodonta* of the type of *G. livera* (Say). It is very likely a distinct species, but the resemblance to *H. evanstonensis* is such that it seems better at present to regard it as a variety.

Hab.— "About three miles north of Ralston; ? Wasatch (Ralston Beds); Big Horn Basin, Wyoming." Collected by W. J. Sinclair, Aug. 12, 1911.

It was found with a couple of *Physa pleromatis* White and a quantity of *Vivipara paludinæformis* Hall.

Glyptostoma (?) **spatiosum** (*Meek & Hayden*).

Helix spatiosa MEEK & HAYDEN, Proc. Acad. Nat. Sci., Phila. for 1861, p. 446.
Macrocyclis spatiosa (M. & H.) MEEK, Rept. U. S. Geol. Surv. Terr., IX (1876), p. 594.

The collection contains very good specimens from the Wind River Beds, five miles west of Buck Spring, Alkali Creek, Wyoming, collected by Walter

Granger, Aug. 23, 1909. The shell has the closest possible resemblance to the living (Californian) *Glyptostoma newberryanum* (W. G. Binney), which was formerly referred to *Macrocyclis,* the genus *Glyptostoma* not having been separated when Meek wrote. Our largest specimen of *spatiosum* has a diameter of 47 mm. which happens to be exactly the diameter of Binney's largest *G. newberryanum.* The modern shell is considerably more depressed than *G. spatiosum.*

OLIGOCENE.

Helix leidyi *Hall & Meek.*

Plate XXII, Figs. 1–3.

Helix leidyi HALL & MEEK, Rept. U. S. Geol. Surv. Terr., IX (1876), p. 604.

This is a species having much the form of the Mexican *Helix buffoniana* Pfeiffer. The shells vary from alt. 28, diam. 29 mm., to alt. 23, diam. 30 mm., but this appears to be a matter of individual variation. The more depressed form occurs along with the subglobose form in the Protoceras beds.

The localities represented are (1) Protoceras Beds, Cheyenne R., S. Dakota, and (2) Oreodon Beds, White River, one mile north of Grover, S. Dakota, 1902. In the original description, this species was ascribed to the Miocene.

Omphalina oreodontis sp. nov.

Plate XXI, Figs. 10, 11.

Shell depressed, with about 3½ whorls, the last near the mouth as broad as the whole spire; upper surface not well preserved, but showing feeble oblique striæ following the lines of growth; under surface of last whorl smooth and shining, porcelain-like, without evident sculpture; columella apparently rather robust; umbilicus reduced to a chink, or at least small and narrow; aperture nearly 12 mm. high, 13 broad; periphery rounded. Max. diam. 24, alt. 13 mm.

Locality.— Oreodon Beds, Pawnee Buttes, Colorado.

Except that it is more depressed, this seems to correspond very closely with *O. lævigata* (Pfeiffer) of the Southern States.

Polygyra dallii *Stearns.*

Helix (Monodon ?) dallii STEARNS, Bull. 18, U. S. Geol. Survey (1885), p. 14.
Polygyra dalli STEARNS, Proc. Wash. Acad. Sci., II (1900), p. 655.

John Day Formation, John Day Basin, Oregon, collected by Wortman, Sternberg and others, about 1879.

This should not be cited as of "Stearns ms., White," as the whole of the description is by Stearns, and is properly credited to him.

FRESHWATER GASTROPODA.

EOCENE.

Planorbis militaris *White.*

One, in the same material as the types of *Oreohelix grangeri*. Ralston Beds (Lower Eocene), Big Horn Basin, Wyoming.

Planorbis utahensis *Meek.*

In spite of its name, this species was originally described from Wyoming. The present excellent material has two labels, the field label stating that it is from Washakie B, upper beds, below white stratum, Haystack M., east Wyo.; collector P. M., Oct. 2, 1906.

The other, later, label says Washakie horizon ? A.

Physa pleromatis *White.*

Two collected with *Gastrodonta* (?) *sinclairi*, Big Horn Basin, about three miles north of Ralston (*W. J. Sinclair*).

Vivipara paludinæformis *Hall.*

Many collected with *Physa pleromatis*, as given above.

Vivipara wyomingensis *Meek.*

One fine shell; Upper Bridger, Bridger Basin, Wyoming (*W. G.*, 1904).

Goniobasis tenera *Hall.*

Good material from the Wasatch, one mile south of St. Joe, Wyoming (*Granger*, 1910). There is some other material in the collection which cannot now be determined definitely.

(1.) Tatman Mt., Big Horn Basin, Wyoming, about 200 ft. below top; possibly White River formation. Ganoid fish scales and very imperfect shells, including a *Vivipara* of the type of *wyomingensis* Meek and a *Planorbis* resembling *florissantensis* Ckll. See also Bull. Am. Mus. N. Hist., XXX, p. 110.

(2.) Laramie Cretaceous, S. Dakota; "locality unknown; with White River collections." A *Vivipara* in very poor condition; it may be *V. lea* M. & H., so far as anything shows.

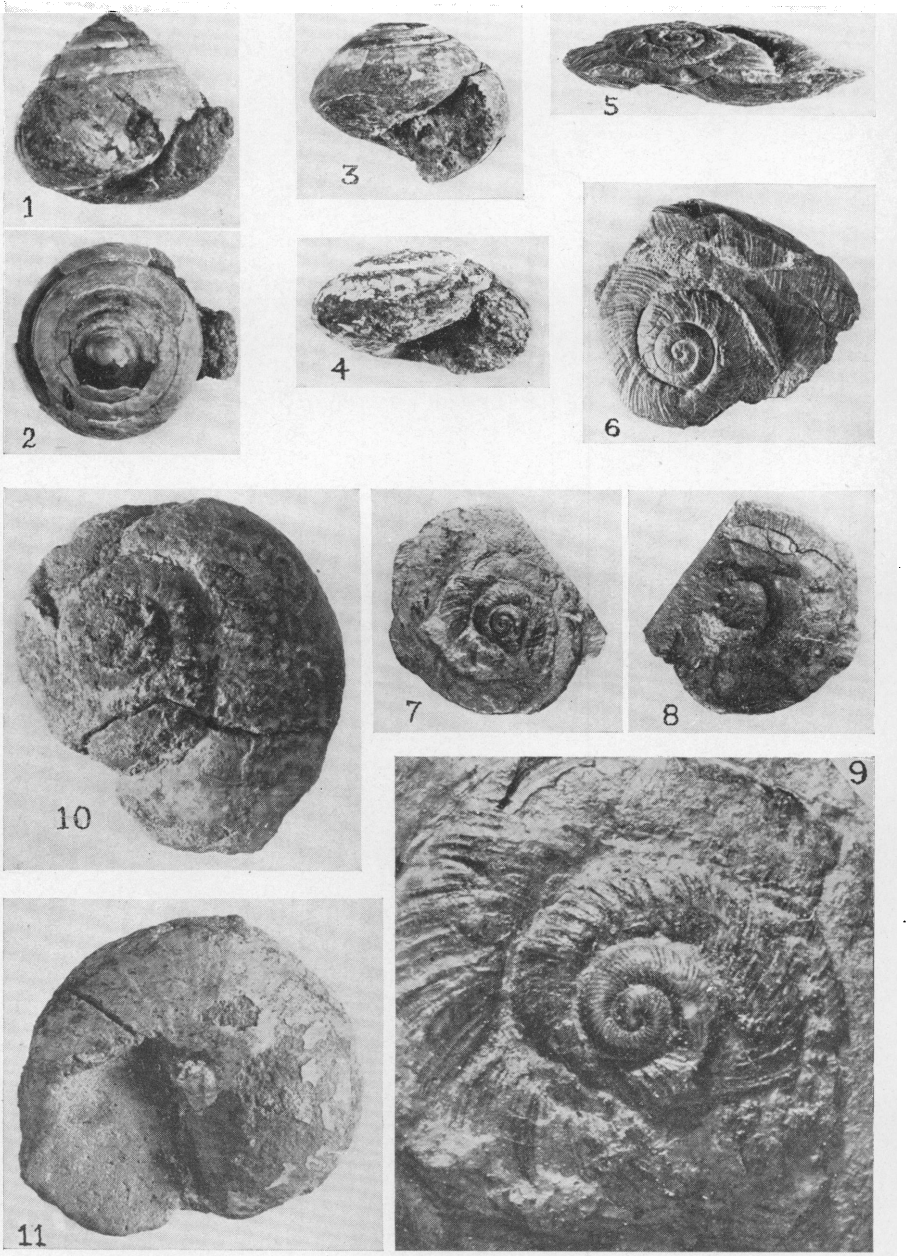
EXPLANATION OF PLATES.

PLATE XXI.

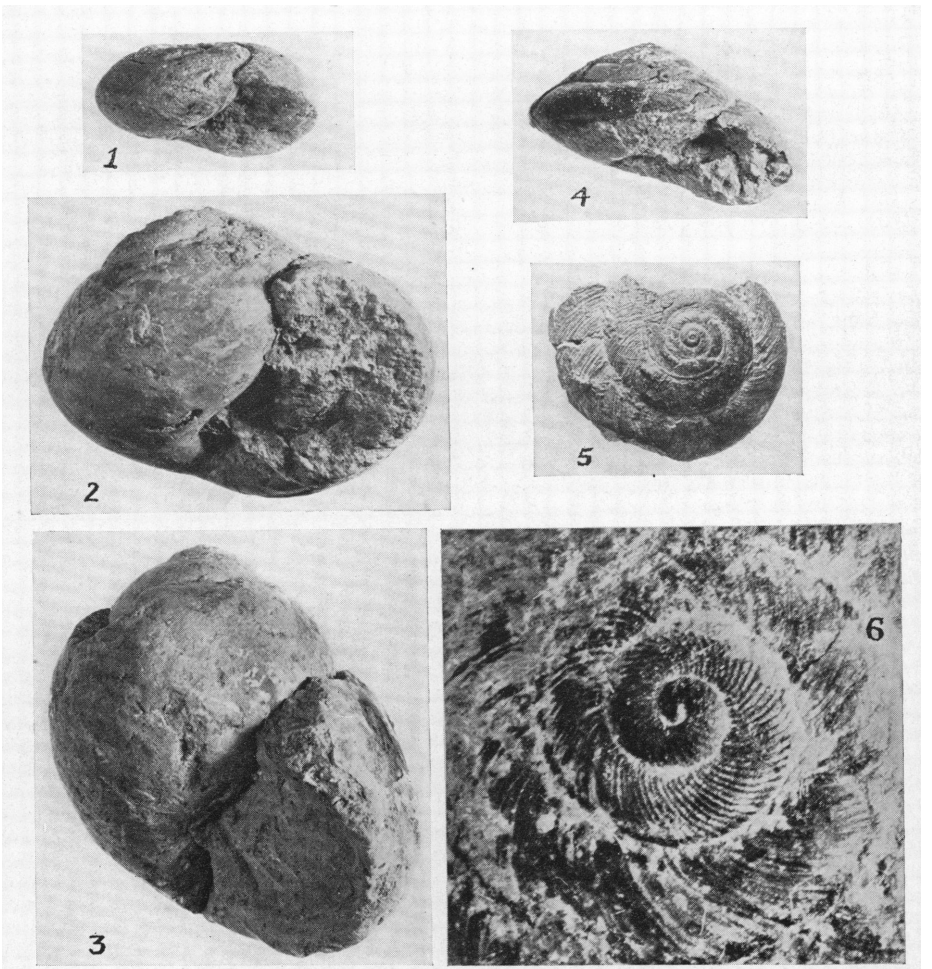
Fig. 1. *Gastrodonta evanstonensis sinclairi* Ckll. Big Basin, Wyo. Type $\frac{3}{1}$.
" 2. " " " " " " " " $\frac{3}{1}$.
" 3. *Helix nacimientensis* White. 70 miles W. of Nacimiente $\frac{1}{1}$.
" 4. " " Depressed form. 70 miles W. of Nacimiente $\frac{1}{1}$.
" 5. *Oreohelix grangeri* C. & H. Big Horn Basin, Wyo. $\frac{2}{1}$.
" 6. " " " " " " " $\frac{2}{1}$.
" 7. " " " " " " " $\frac{2}{1}$.
" 8. " " " " " " " $\frac{2}{1}$.
" 9. " " Spire enlarged. Big Horn Basin, Wyo. $\frac{8}{1}$.
" 10. *Omphalina oreodontis* C. & H. Pawnee Buttes, Col. Type $\frac{2}{1}$.
" 11. " " " " " " " $\frac{2}{1}$.

PLATE XXII.

Fig. 1. *Helix leidyi* Hall & Meek. Young. $\frac{2}{1}$.
" 2. " " $\frac{2}{1}$.
" 3. " " $\frac{2}{1}$.
" 4. *Oreohelix megarche* C. & H. Big Horn Basin, Wyo. $\frac{1}{1}$.
" 5. " " $\frac{1}{1}$.
" 6. " " Spire enlarged. $\frac{8}{1}$.



TERTIARY MOLLUSCA FROM THE WEST.



Tertiary Mollusca from the West.