New Mexico Geological Society

Downloaded from: https://nmgs.nmt.edu/publications/guidebooks/38



Paleocene nonmarine mollusca from the Raton Formation, Raton Basin, New Mexico

Joseph H. Hartman
1987, pp. 271-273. https://doi.org/10.56577/FFC-38.271

in:

Northeastern New Mexico, Lucas, S. G.; Hunt, A. P.; [eds.], New Mexico Geological Society 38 th Annual Fall Field Conference Guidebook, 354 p. https://doi.org/10.56577/FFC-38

This is one of many related papers that were included in the 1987 NMGS Fall Field Conference Guidebook.

Annual NMGS Fall Field Conference Guidebooks

Every fall since 1950, the New Mexico Geological Society (NMGS) has held an annual Fall Field Conference that explores some region of New Mexico (or surrounding states). Always well attended, these conferences provide a guidebook to participants. Besides detailed road logs, the guidebooks contain many well written, edited, and peer-reviewed geoscience papers. These books have set the national standard for geologic guidebooks and are an essential geologic reference for anyone working in or around New Mexico.

Free Downloads

NMGS has decided to make peer-reviewed papers from our Fall Field Conference guidebooks available for free download. This is in keeping with our mission of promoting interest, research, and cooperation regarding geology in New Mexico. However, guidebook sales represent a significant proportion of our operating budget. Therefore, only *research papers* are available for download. *Road logs*, *mini-papers*, and other selected content are available only in print for recent guidebooks.

Copyright Information

Publications of the New Mexico Geological Society, printed and electronic, are protected by the copyright laws of the United States. No material from the NMGS website, or printed and electronic publications, may be reprinted or redistributed without NMGS permission. Contact us for permission to reprint portions of any of our publications.

One printed copy of any materials from the NMGS website or our print and electronic publications may be made for individual use without our permission. Teachers and students may make unlimited copies for educational use. Any other use of these materials requires explicit permission.

This page is intentionally left blank to maintain order of facing pages.

PALEOCENE NONMARINE MOLLUSCA FROM THE RATON FORMATION, RATON BASIN, NEW MEXICO

JOSEPH H. HARTMAN
North Dakota Mining and Mineral Resources Research Institute, University Station, Box 8103, Grand Forks, North Dakota 58202

Abstract—In 1917, W. T. Lee reported on the only faunule of nonmarine Mollusca so far known from the Upper Cretaceous-Paleocene strata of the Raton Formation of the Raton Basin, New Mexico. The specimens collected by Lee are poorly preserved as goethite-stained steinkerns consisting of fine-grained feldspathic sandstone. The taxa recognized include the bivalve Unionidae, gen. & sp. indet. and the viviparid gastropods *Viviparus* sp. indet. and *Campeloma* sp. indet. These freshwater fossils were found on the top of the west wall of Dillon Canyon, about 1.6 km above the mouth of Coal Canyon, north of Blossburg, Colfax County, New Mexico. The stratigraphic position of the locality is estimated to be about 195 m above the base of the Raton Formation and approximately 165 m above the base of the Paleocene.

INTRODUCTION

In 1917, W. T. Lee reported on the only faunule of nonmarine Mollusca so far known from the Upper Cretaceous-Paleocene strata of the Raton Formation of the Raton Basin, New Mexico. The locality data, stratigraphic context and specimens collected by Lee are reviewed below to summarize this record of bivalves and gastropods and encourage the report of any new or previously unreported fossil occurrences.

LOCALITY DATA

The Raton Formation locality was recorded in the U.S. Geological Survey (USGS) Mesozoic locality catalog as number 5600, with the following data: "Orig. No. 555, Upper Cretaceous(?), west side of Dillon Canyon, one mile [1.6 km] north of mouth of Coal Canyon, 400 ft [121.9 m] above Raton coal . . . collected by W. T. Lee, 1908." In his field book for 13 August, Lee recorded "at top got shells No. 555" (Lee, 1908, p. 16). In the first published reference to this locality, Lee (1917, p. 104) reported the fossil shells in reference to plant localities and the base of the Raton Formation:

> *Sabal? ungeri* (Lesquereux) Knowlton was found (U.S. Geol. Survey fossil locality 5150) half a mile southwest of mouth of Coal Canyon, 300 feet [91.4 m] above base of the Raton formation; about 100 feet [30.5 m] higher (U.S. Geol. Survey fossil locality 5147) *Sabalites grayanus* (Lesquereux) Lesquereux, *Juglans schimperi* Lesquereux, and *Fiscus occidentalis* Lesquereux were found. At the latter horizon, about one-half mile farther west (U.S. Geol. Survey fossil locality 5600) were found a few poorly preserved shells of freshwater species, which were identified as *Unio* sp. (fragmentary casts), *Viviparus* sp., and *Campeloma*? sp. [taxa identified by T. W. Stanton of the USGS].

Additional reference to the location of the above sites is given in the sentence that follows (Lee, 1917, p. 104):

> In the north wall of the canyon opposite these localities and 150 feet [45.7 m] above the base of the Raton formation (U.S. Geol. Survey fossil locality 5418) *Sabal? ungeri* (Lesquereux) Knowlton and *Palmocarpon palmarum* (Lesquereux) Knowlton were found in place. . . .

Lee (1917, pl. 1) marked the locality of USGS locality 5600 in sec. 17, T31N, R23E. A transfer of this location to the Brilliant quadrangle (in Lee, 1922; 1915 map edition, 1:62,500), on which townships are show, clearly appears to indicate a locality position near the top of a northeast-facing ridge on the south side of a tributary to Dutchman Canyon. This location seems to disagree with the more or less straightforward record of the locality as on the top of the ridge forming the west (or south) wall of Dillon Canyon, and may be interpreted as in keeping with Lee's (1922, p. 8) reference to the locality as "on the ridge south of Dillon Canyon." The above possibly conflicting information is given to aid in any relocation attempt.

If the locality is on the top (about 7,440 ft; 2,268 m) of the west (or south) wall of Dillon Canyon about one mile upstream from the mouth of Coal Canyon, the following Universal Transverse Mercator (UTM) coordinates represent a reasonable site for exploration: 543,740E, 4,086,700N, zone 13, Tin Pan Canyon quadrangle (1971 edition, 1:24,000; without township base), Colfax County. If the locality occurs on the top (7,440 ft; 2,268 m) of the west wall of a minor tributary of Dutchman Canyon, a site for exploration may reasonably center on the UTM coordinates 543,280E, 4,086,420N. The above locality review revises information reported by me (Hartman, 1981; locality L4229). In 1981, D. L. Wolberg, J. D. Archibald, S. G. Lucas and others were unsuccessful in their attempt to relocate the site on the west wall of Dillon Canyon in significantly plant-covered exposures.

STRATIGRAPHIC CONTEXT

The stratigraphic position of the locality was cited in the USGS Mesozoic locality catalog as 400 ft (121.9 m) above the Raton coal bed and later referenced in publication (quoted above) as 400 ft (121.9 m) above the base of the Raton Formation. The Raton coal bed, or possibly more appropriately referred to as the Raton coal zone, occurs in the Vermejo Formation, which is generally erosionally unconformable with the overlying Raton Formation and conformable with the underlying Trinidad Sandstone. The thickness of the Vermejo Formation at the mouth of Dutchman Canyon on Dillon Canyon is 32 ft (9.8 m), where the Raton coal bed is located 17 ft (5.2 m) below the pebbly conglomeratic basal member of the Raton Formation (Lee, 1917, pl. 5, section 61; 1924, pl. 2, section "near 226"). A somewhat greater thickness of 41.4 ft (12.6 m) is reported near Blossburg, about 0.5 km south of Dutchman Canyon (Lee, 1917, pl. 5, section 62; 1924, pl. 2, section 239). The thickest coal in this section is 5.5 ft (1.7 m) and occurs 8 ft (2.4 m) below the base of the Raton Formation. This coal bed would probably be traditionally referred to as the Raton coal (see Lee, 1924, p. 15), although it is probably not directly correlative with coal beds of similar thickness referred to as the Raton near the base of the Vermejo measured in drill-hole sections at locations Q, R and S in Dillon Canyon (see Lee, 1924, pp. 105–107, pls. 1, 12). Assuming, as originally reported by Lee, the stratigraphic position of the fossil shell locality to be 400 ft (121.9 m) above the Raton coal bed, the locality would be about 370 ft (112.8 m) above the base of the Raton Formation. However, on the basis of a difference in elevation, assuming a negligible dip, between the average elevation of the top of the ridge (7,440 ft; 2,268 m) on the west side of Dillon Canyon, and the top of the Raton coal bed in drill-hole section at location R (estimated elevation of 6,772 ft; 2,064 m), the stratigraphic position of the shell locality may be more closely estimated to be 638 ft (±30 ft; 194.5 m, ±9.1 m) above the base of the Raton Formation. This difference in stratigraphic position reflects, in part, the less accurate estimation of the elevation of the locality relative to the Raton coal bed at the time the fossils were collected. In his field notes, Lee estimated the difference in elevation between the locality (top of ridge) and valley of Dillon

Canyon at 0.5 mi (0.8 km) above the mouth of Coal Canyon to be 350 ft (107 m) (Lee, 1908, p. 16). The actual difference is closer to 550 ft (168 m).

In the vicinity of the town of Raton, New Mexico, Pillmore et al. (1983, 1984) recognized the position of the Cretaceous/Tertiary boundary at about 30 m (98.4 ft) above the base of the Raton Formation. This determination is based on palynological criteria and corresponds to a relatively high iridium anomaly. Assuming similar criteria for recognizing the Raton/Vermejo Formation contact, the fossil shell locality is probably about 540 or more ft (164.5 m) above the base of the Paleocene.

PALEONTOLOGY

The bivalves and gastropods are preserved primarily as poorly replaced, dark yellowish-orange, goethite-covered steinkerns. External surface features are only vaguely preserved in a few specimens. The steinkerns and associated matrix consist of well-lithified, grayish-olive weathering to olive-gray, immature, poorly-sorted, feldspathic, fine-grained sandstone with oriented, elongate, very fine-to-fine clay pebbles. The matrix grains are composed largely of angular quartz. Interstices are filled by kaolinite and minor amounts of other clay minerals. X-ray diffraction indicates that microcline and albite are the dominant feldspars. Little or no cement is present, and many grains are clay-rimmed. Mafic minerals, such as biotite, are deformed, probably through compaction. The gastropod molds represent specimens of approximately the same size, usually of the last and second to the last whorls, indicating fragmentation and sorting prior to final deposition. All specimens are distorted and compressed in some manner oblique to the axis of coiling. There is no telescoping.

Class **Bivalvia**
Family **Unionidae** gen. & sp. indet.
Figs. 1a, b

1917 *Unio* sp. (fragmentary casts): Stanton in Lee, p. 104.

The *Unio* sp. determination refers to two incomplete specimens. The assignment to *Unio* has little meaning in the classification of fossil freshwater bivalves as it now exists, except as a catch-all for poorly preserved or umbonally unsculptured specimens. Neither specimen preserves the umbonal area, and the shell marginal-outline is sufficiently general to prohibit any generic assignment. The most complete specimen consists of portions of a splayed pair of articulated valves. The best preserved valve is elongate in shape, with an overall length somewhat greater than 32 mm and a height of 18 mm. The second specimen is a flattened posterior fragment of an elongate clam. In terms of general simple valve shape, these specimens are similar to *"Unio" whitei*? Henderson reported from the Nacimiento Formation near Cuba, Sandoval County, New Mexico (Hartman, 1981, pp. 944–945; locality L388), but the material is too incomplete for adequate comparison.

Class **Gastropoda**
Family **Viviparidae**
Viviparus sp. indet.
Figs. 1c, d

1917 *Viviparus* sp.: Stanton in Lee, p. 104.

One specimen in the lots collected by Lee is referable to *Viviparus*. The specimen is distorted and compressed oblique to the axis of coiling viewed from the right lateral-outside apertural margin. The specimen is medium in size, probably about 12 to 16 mm in height. The maximum number of whorls observed was 1.9, representing the last and second to the last whorls. The shell shape is subtrochiform, and probably broadly conic (spire angle between 50–60°). The shell whorls may be slightly shouldered. The specimen appears to be umbilicate, apparently

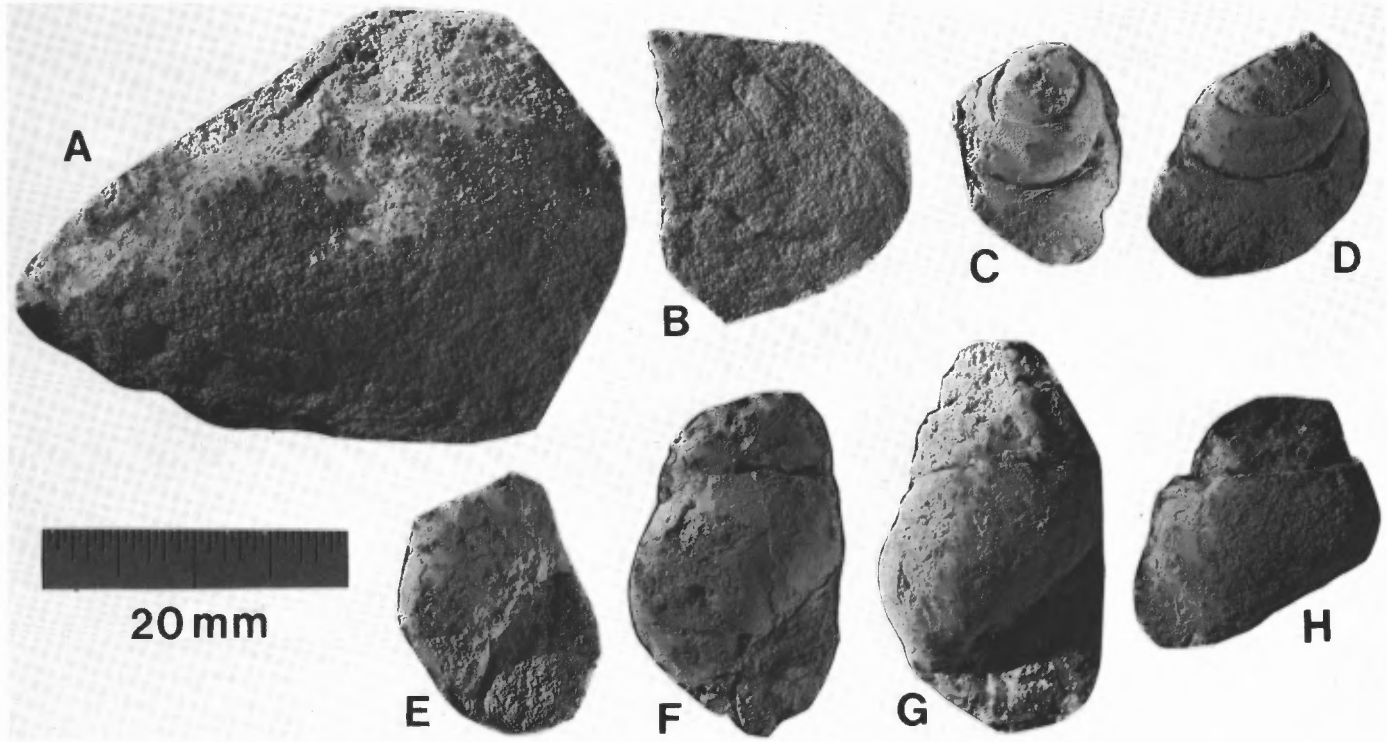


FIGURE 1. Paleocene nonmarine Mollusca of the Raton Formation, New Mexico. a, b, Unionidae gen. & sp. indet.; a, left valve, external view; USNM-I 416,478; post-umbonal and ventral margin preserved; anterior and umbonal areas are non-cast matrix; ligament area is slightly raised left-to-right ridge; portion of right valve above ridge. b, left valve, external view, posterior fragment; USNM-I 416,479. c, d, *Viviparus* sp. indet., USNM-I 416,480; c, apertural-right lateral view, specimen compressed; d, right lateral view. e–h, *Campeloma* sp. indet.; e, apertural view, aperture in plane of paper; USNM-I 416,481; f, apertural view, specimen compressed, note umbilicus; USNM-I 416,482; g, apertural view, specimen compressed, for general form; USNM-I 416,483; h, abapertural view, note shelf development; USNM-I 416,484. All specimens are in matrix and coated for photography. USNM-I = U.S. National Museum (of Natural History) – Invertebrate Paleontology Collection.

as a narrow slit. Growth lines, secondary sculpture and the aperture are not preserved. The specimen suggests the form of *Viviparus meeki* Wenz, which has also been reported from the Nacimiento Formation in Torreon Wash, west of Cuba (Hartman, 1981, p. 279; locality L3279). The specimen, however, lacks a sufficient number of characters for adequate assignment.

Campeloma sp. indet.
Figs. 1e–h

1917 *Campeloma*? sp.: Stanton in Lee, p. 104

Twenty-one specimens are probably assignable to *Campeloma* sp. indet. All of the specimens have less than two whorls, and, in general, the replaced shell consists of a goethite stain on the steinkern surface. If complete, the shells would be of medium size and subovate in form. The last two whorls of one specimen are about 20 mm in height (Fig. 1g). The suture appears to be moderately impressed, and only one specimen has any evidence of shouldering. In that specimen (Fig. 1h), a strong shelf is developed similar to that described for a species of *Campeloma* from the late Maestrichtian and early Paleocene of the northern Great Plains (species in review: Hartman, 1984, p. 244). A well-preserved aperture in one specimen is ovate in form, with an aperture height and width of 9.1 and 7.2 mm, respectively. The outside apertural margin is nearly vertical and appears sinusoidal as in other species of *Campeloma*. A few specimens indicate that this taxon is umbilicate. As with the specimen of *Viviparus*, there are too few diagnostic characters preserved to warrant a more specific diagnosis.

SUMMARY

Although poorly preserved and low in diversity, this faunule does pose interesting questions and comparisons to the middle Paleocene fauna of the Nacimiento Formation. Additional specimens from the Raton Formation are necessary to permit more definitive taxonomy and biostratigraphy.

ACKNOWLEDGMENTS

At the time I initially reviewed the Paleocene and Eocene nonmarine Mollusca of New Mexico (Hartman, 1981), I had been unable to locate the specimens from the Raton Formation in the USGS collections in the U.S. National Museum of Natural History. Since then, I found the specimens, which have subsequently been transferred to a newly occupied USGS warehouse at the Denver Federal Center. Permission to examine the specimens was given by Bill Cobban of the Paleontology and Stratigraphy Branch. USGS Field Record information was kindly provided by Debbie Rowen. Mineralogic and petrographic information was obtained with the aid of Nels Forsman and Bob Stevenson of the University of North Dakota. This research was supported by the Philip McKenna Foundation and the University of North Dakota.

REFERENCES

Hartman, J. H., 1981, Early Tertiary nonmarine Mollusca of New Mexico: a review: Geological Society of America Bulletin, v. 92, pp. 942–950.

Hartman, J. H., 1984, Systematics, biostratigraphy, and biogeography of latest Cretaceous and early Tertiary Viviparidae (Mollusca, Gastropoda) of southern Saskatchewan, western North Dakota, eastern Montana, and northern Wyoming [Ph.D. dissertation]: Minneapolis, University of Minnesota, 928 pp.

Lee, W. T., 1908, [Field notes for the Raton Basin]: U.S. Geological Survey, Field Records Library, Fieldbook 4214, 82 pp.

Lee, W. T., 1917, Geology of the Raton Mesa and other regions in Colorado and New Mexico: U.S. Geological Survey, Professional Paper 101, pp. 9–221.

Lee, W. T., 1922, Description of the Raton, Brilliant, and Koehler Quadrangles [New Mexico-Colorado]: U.S. Geological Survey Atlas, Folio 214, 17 pp.

Lee, W. T., 1924, Coal resources of the Raton coal field, Colfax County, New Mexico: U.S. Geological Survey, Bulletin 752, 254 pp.

Pillmore, C. L., Tschudy, R. H., Orth, C. J. and Gilmore, J. S., 1983, Stratigraphy of the Cretaceous-Tertiary boundary in the southern Raton Basin, New Mexico and Colorado: Geological Society of America, Abstracts with Programs, v. 15, p. 308.

Pillmore, C. L., Tschudy, R. H., Orth, C. J., Gilmore, J. S. and Knight, J. D., 1984, Geologic framework of nonmarine Cretaceous-Tertiary boundary sites, Raton Basin, New Mexico and Colorado: Science, v. 223, pp. 1180–1183.



Some of the "knights" of the Cretaceous-Tertiary boundary in the Raton Basin. From left to right: Adrian Hunt, Charles Pillmore (kneeling), Michael Payne, the late Donald Wolberg and Jere Knight. Photograph taken in September 1981 at Cretaceous-Tertiary boundary outcrop near Raton, courtesy of C. Orth.