A SLAB OF FOSSIL TURTLES FROM EOCENE OF WYOMING, WITH NOTES ON THE GENUS ECHMATEMYS.

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ABSTRACT. A slab containing fifteen turtle specimens prepared for exhibition in the United States National Museum is described. The article is concluded with a discussion of the variable structures in the carapace of the genus *Echmatemys*.

A UNIQUE exhibit added to the collection of fossil vertebrates in the United States National Museum is in the form of a block of matrix containing fifteen turtle shells *in situ*. This block was quarried from a deposit where the shells outcropped for thirty or more feet along the hillside, and extended inward for an undetermined distance, thus indicating the final resting place of several hundred of these lowly reptiles. The closely placed shells are all lying right side up in life-like position forming a thin layer from four to six inches in thickness. Of the twenty individuals collected in and around this one block, all but one, *Chisternon*, pertain to the genus *Echmatemys*.

This deposit was found by the 1930 Smithsonian Paleontological Expedition to the Bridger Basin in southwestern Wyoming, but nothing was done with it at that time. In 1941, however, in the belief that a slab showing the shells in place would make an interesting exhibition piece, Dr. C. L. Gazin, in charge of the expedition of that year, was instructed to visit the locality and if feasible to collect a block of suitable proportions. This was done and a slab 42 x 66 inches, weighing more than 1200 pounds, was secured. These shells have been skillfully worked out in relief by Chief Preparator Norman H. Boss, care having been observed not to disturb their original relationships, as shown in Plate 1. The rock was of such a nature that it could not be dressed to a condition suitable for exhibition purposes so its surface has been entirely replaced by artificial matrix cast from the original and colored to closely simulate it. At one corner of the block is an artificial section of the bank that shows two of the specimens partly excavated. It is thought this visual conception will better

explain to the visitor how all were originally embedded in the ground.

The quarry is located in the B horizon of the Bridger formation in the badlands on Levett Creek and immediately north of the Mountain View-Lone Tree road where it rises to cross the escarpment leading to the drainage of Cottonwood Creek.

The specimens are in a matrix of greenish gray tuff that Mr. E. P. Henderson, after a study of thin sections, reports on as follows: "The rock in which the turtles were found consists largely of volcanic debris and clay pellets. It contains many minerals common to volcanic ash, e.g. quartz, plagiclase, feldspar, biotite, greenhornblende and some devitrified glass. Most likely it is transported volcanic material. It may be that this rock represents an ash fall on a muddy basin or flood plain where clay pellets existed prior to an ash shower. The case is not clear cut either way and I can see nothing in the section to throw light on how the turtles could have been killed or covered."

The volcanic nature of the matrix certainly allows the suggestion that the turtles may have originally met their death as the result of an ash shower. If such an explanation is accepted, however, it calls for their subsequent disinterment and transportation to their present resting place. That the assemblage of such a large number of turtle specimens in this one spot does not represent a primary deposition after death is clearly indicated by the lack of articulated limbs and feet and the total absence of skulls, cervical, and caudal vertebrae. Likewise the missing carapace ends of a few specimens were absent from the surrounding matrix thus showing they were not broken on the spot. Curious enough the plastra of all are in good preservation, even those in which the carapace has suffered considerable damage.

The fact that all of the shells are lying in natural orientation is also difficult of explanation, unless it be that the arched carapaces may have trapped sufficient air to cause them to float right side up.

In 1908 when Dr. O. P. Hay[1] made a study of all available *Echmatemys* specimens, he called attention to the difficulty of characterizing species of the genus, and pointed out at some

[1] Hay, O. P.: 1908, Fossil Turtles of North America, Carnegie Institution of Washington, Pub. 75.

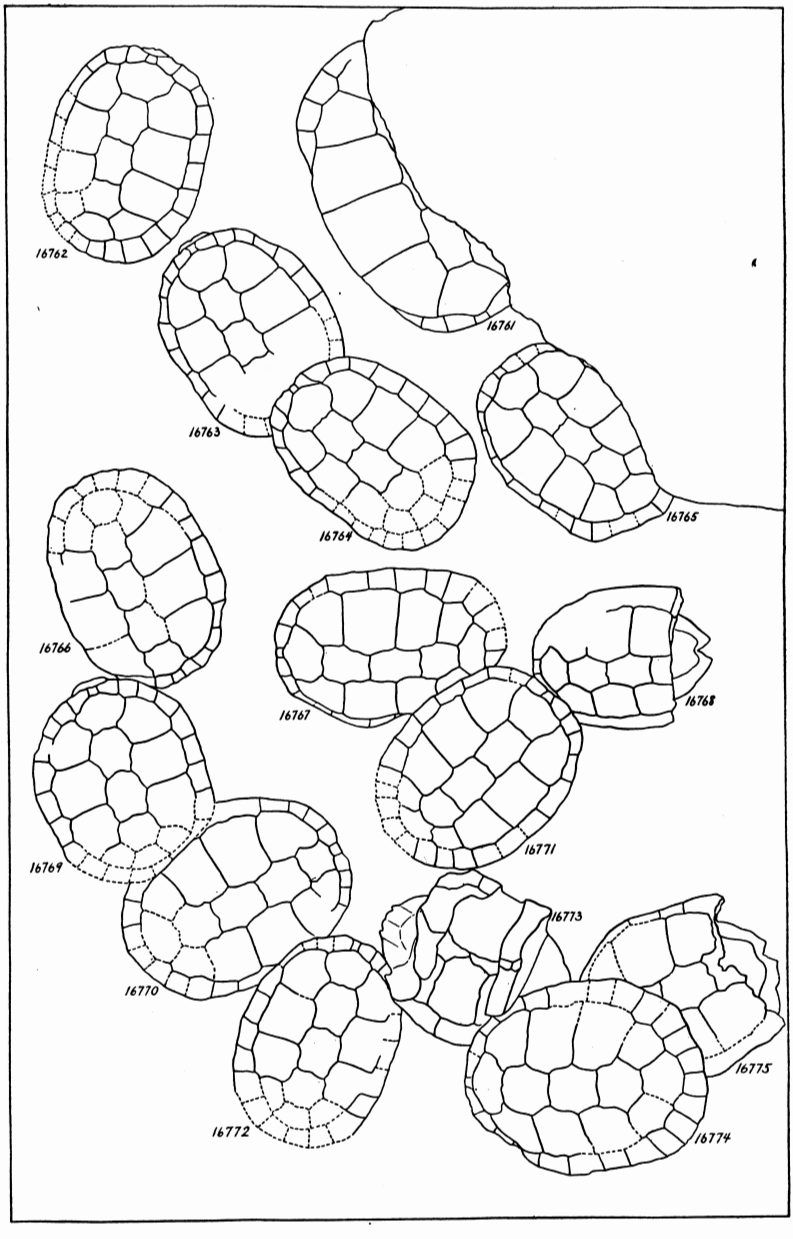

Fig. 1. Carapaces of *Echmatemys*, showing outlines of dermal scutes. No. 16761 U.S.N.M. *E. haydeni* (Leidy); Nos. 16762 to 16775 U.S.N.M. *E. wyomingensis*. About 1/10 natural size.

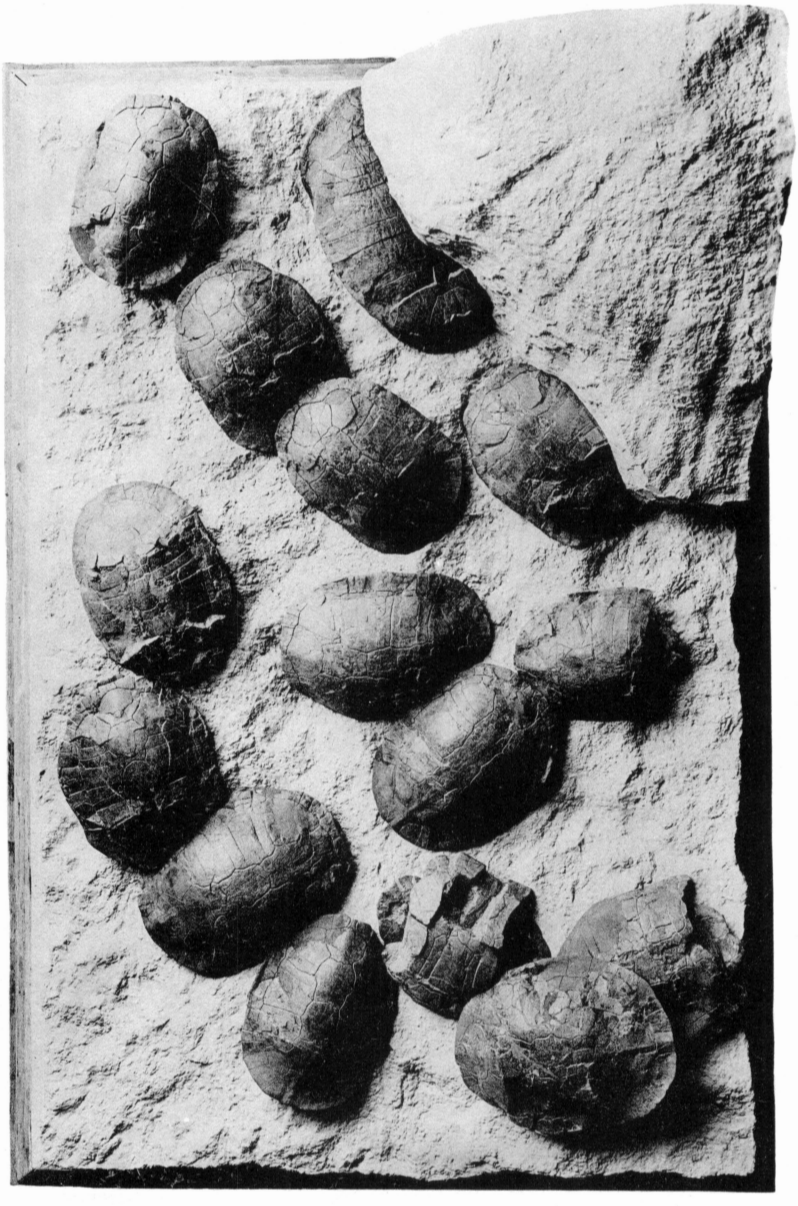

PLATE 1.

Slab of *Echmatemys* specimens Nos. 16761 to 16775, U. S. National Museum, shown as they lay in the ground. Viewed from above. About 1/10 natural size.

length the inconstant nature of the structures used for specific differentiation. These observations are abundantly verified by the specimens now before me, even though they are from a common geological horizon, and presumably consist of individuals from a restricted area.

Fifteen specimens in the block, see Text Fig. 1, four others collected adjacent to it, and four specimens now in the Carnegie Museum, Pittsburgh, Pennsylvania collected from this same deposit by Dr. J. LeRoy Kay, can all be certainly identified as belonging to the genus *Echmatemys*. After long and critical comparison it was finally concluded that of the twenty-three specimens twenty-two are to be referred to *Echmatemys wyomingensis* and one (No. 16761, U.S.N.M.) to *E. haydeni*.

Of the 18 specimens forming the U. S. National Museum series, 9 are complete enough to furnish measurements of the carapace. The longest measures 350 mm., the shortest 292 mm; their average length is 313 mm., average width 226 mm. These proportions are well within the range of measurements given by Hay for representatives of this species.

The vertebrals show considerable variation both in size and form. Of 17 specimens available for comparison, 10 may be grouped as having vertebrals with parallel sides; 7 as being bracketed; 13 have the second and third vertebrals subequal in length; 3 have the second shorter than the third. The first vertebral is usually widely expanded on the anterior end, but as clearly shown in Text Fig. 1, Nos. 16766 and 16770 have the first vertebral contracted at this end. As a rule the sulci are moderately impressed, but there are at least two individuals that have them deeply impressed. The nuchal scute is preserved on 9 individuals, 4 of which have the length equal to the width, the width slightly exceeds the length in the remaining five. The average length of this scute is 12.1 mm., average width is 13.2 mm.

In the few specimens in which the sutures are visible, the neurals are consistently hexagonal. There is some variation in their proportions, but not more than would be expected of individuals within the species. All of the shells have been flattened by pressure which in most instances has affected their symmetry, and has probably widened the carapace greater than in life.

In outline the carapaces are subovate, somewhat contracted in front of the forelegs. In most of the specimens the anterior ends are truncate, with or without slight emargination above the neck. Specimen No. 16772 differs from the others in having a more narrowed and pointed end. Taken all in all, however, the outlines of the shells are fairly constant in form, see Fig. 1. The shell surfaces are smooth, and with the exception of Nos. 16771 and 16774 are free from median ridges. The two exceptions show them only on the downward slope of the back.

For obvious reasons it has not been possible to contrast the plastra of their scutes. Regarding this portion of the *Echmatemys* carapace Hay observes, "Little aid in the differentiation of the species has been derived from the proportions of the plastral scutes." Likewise the buttresses are unavailable for study although much relied upon in the past study of the species of this genus.

At the time of writing his Fossil Turtles of North America, Hay recognized twelve species of *Echmatemys* as occurring in the Bridger formation. Arranged chronologically these were as follows:

	DATE
E. wyomingensis (Leidy))	1869
E. haydeni (Leidy)	1870
E. stevensoniana (Leidy)	1870
E. latilabiata (Cope)	1872
E. septaria (Cope)	1873
E. shaughnessiani (Cope)	1882
E. arethusa Hay	1908
E. eynae Hay	1908
E. ocyrrhoe Hay	1908
E. aegle Hay	1908
E. naomi Hay	1908
E. pusilla Hay	1908

In the hope of finding evidence that some of the twelve recognized species from the Bridger were confined to certain horizons of the formation, a canvass was made, not only of the National Museum collections, but of all other sources of information, with rather indifferent results.

In addition to the series of *Echmatemys* specimens discussed in the preceding pages, the U. S. National Museum collections contain the remains of seventeen other individuals of this genus, four of which are original types. All of these have been collected from various localities in the Bridger Basin. Most of

the new materials are well preserved specimens, and although they can be confidently identified as to genus, their assignment to species is often made with reservations. Of these thirteen specimens two were identified as pertaining to *E. wyomingensis* (Leidy), two to *E. septaria* (Cope), three to *E. shaughnessiana* (Cope), two to *E. haydeni* (Leidy), one to *E. aegle* Hay, three to *Echmatemys* species.

It was determined that most of the known *Echmatemys* specimens were collected from the B horizon of the Bridger. Only one, *E. septaria*, appears to be confined to the upper part of the Bridger, in either C or D horizons. One specimen of *E. haydeni* was found in C horizon, but five other specimens including the type are reported from the B level.

In all probability, too many species of this genus have been named, but more specimens must be assembled before it is clear as to which of these could or should be eliminated. Using the same criteria as used in the past, I would be fully justified in establishing at least one new species from the present assemblage, but until more is learned of the range of variation in the genus, to do so would accomplish no useful purpose and would only add to an already confused situation.

U. S. National Museum,
Washington, D. C.