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FOSSIL CHELONIANS, *CHRYSEMYS* AND *CLEMMYS*, FROM THE UPPER PLIOCENE OF IDAHO

G. R. Zug¹

The extant reptilian fauna of the Columbian Plateau and the northern half of the Basin and Range Province lacks turtles. Their absence appears to be of relatively recent occurrence, for turtles persist in the surrounding areas and have been found in Plio-Pleistocene deposits, Glenn Ferry Formation, of this region. The latest faunal list for the Glenn Ferry Formation (Taylor, 1966, p. 75) includes *Kinosternon* sp. and *Pseudemys idahoensis*. Through the effort of Dr. C. W. Hibbard and his field parties, a large collection of chelonian shell fragments has been amassed from the vicinity of Hagerman, Twin Falls County, Idaho. Unless indicated otherwise, the specimens reported herein are from the Hagerman area.

Family Kinosternidae

Kinosternon Spix

REMARKS. There are no elements that can be assigned to this taxon. Unfortunately, it seems that Taylor (1966) misread Hibbard's (1959), p. 11) statement. Hibbard indicated only that the shell fragments may represent "*Kinosternon*, *Chrysemys*, or *Pseudemys*." This error was compounded by the limited distribution of a faunal compilation and as such has appeared elsewhere (Holman, 1968).

Family Testudinidae

Chrysemys idahoensis (Gilmore)

MATERIAL. Peripherals, UMMP V45276A, V52778; Hyoplastron, UMMP V53417; Xiphiplastra, UMMP V53417, V54129.

REMARKS. Of the two turtles represented in this collection, very few elements can be assigned to *C. idahoensis*. All *Chrysemys* elements were compared with Gilmore's type series and match the morphology therein. A humeropectoral sulcus extends across the entire width of the hyoplastron and distally forms an anterior loop (Gilmore, 1933, Pl. 2). Both xiphiplastra possess a strong step laterally between the femoral and anal scutes and a shallow dorsal groove medial of the scutes. These features are characteristic of *C. idahoensis*.

An anterior half of a plastron (UMMP V42609) has been recovered from the Late Hemphillian Wolf Canyon area of Meade County, Kansas. The humeropectoral sulcus of this plastron forms an anterior loop laterally on each side, indicating that this fossil is also *C. idahoensis*. Thus temporally, *C. idahoensis* extends from approxi-

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mately 3.5 million BP to about 5 million BP and spatially from south-central Idaho to southwestern Kansas.

In the original description, Gilmore (1933) suggested that the affinities of this species were with the *rubriventris* group and not with *Trachemys*, i.e., the *scripta* group. The reverse, however, seems to be true. In the *rubriventris* group, the skull characteristically possesses a beak bordered by cusps, a high, serrated, median ridge with a pair of anteromedial cusps on the dorsal alveolar surface, a shallow posteromedial indentation of the dorsal alveolar surface, and a small pro-otic tuberosity. *C. idahoensis* and the *scripta* group have no cusp on the beak, a low, smooth, median ridge with no cusps, a deep posteromedial indentation of the dorsal alveolar surface, and a well developed pro-otic tuberosity. Unlike the skulls of the *rubriventris* or the *scripta* group, the anterior edge of the inferior process of the parietal is buttress-like in *C. idahoensis*, similar to the condition seen in *Malaclemys geographica*. This buttress-like process and the broad alveolar surfaces suggest that this species feed on mollusks.

Clemmys owyheensis Brattstrom and Sturn

MATERIAL. Nuchals, UMMP V34444, V49940, V50201, V53128, V53527, V53556, V53731, V53773; Peripherals, UMMP V45276 (2), V49956, V50349 (14), V52778C-E, V53128 (7), V53264 (6), V53445 (7), V53555, V54595 (5), V55477 (2), V55537; Pygals, UMMP V34444 (4), V49558 (2), V50349 (3), V50553 (2), V50938, V51132, V51277, V51737, V53128 (2), V53264, V53731 (2), V54706, V56076 (3), V56261, V56267; Epiplastra, UMMP V34444, V50349 (3), V53264 (2), V53445, V53553 (2), V53755; Endoplastra, UMMP V34444, V50091, V50349, V53128, V53264 (3), V53445 (2), V53731, V53772 (2), V56327; Hyoplastra, UMMP V53128, V53528 (2); Hypoplastra, UMMP V52778, V53264, V53421, V53555; Xiphoplastra, UMMP V53264 (2), V53445 (3), V53553, V53731.

REMARKS. Brattstrom and Sturn (1959) described *Clemmys owyheensis* on an endoplastron from a Hemphillian (Middle Pliocene) locality in Oregon. *C. owyheensis* is characterized by each gulahumeral sulcus of the endoplastron forming a 33-degree angle or less with the midline, a prominent anterior knob on the endoplastron, and a humeropectoral sulcus crossing the endoplastron. The last character occurs in both *Terrapene* and *Clemmys*. The endoplastron of *Terrapene* is diamond-shaped and in adult specimens inseparably fused with the epiplastra and hyoplastra. The range of variation of the gulahumeral angle is 24 to 37 degrees for the endoplastra from the Hagerman and 31 to 47 degrees for nuchals from seven extant *C. marmorata*. Some recent *C. marmorata* possess prominent anterior knobs on the endoplastra. Thus on the basis of endoplastral characters, the fossil *Clemmys* from the Pliocene cannot be separated from the extant *C. marmorata*. However, the variation in the morphology of the other shell elements from Hagerman, Idaho, suggests that the fossil remains represent a distinct population. Since

the Hagerman endoplastra match the diagnosis of Brattstrom and Sturn, *Clemmys owyheensis* is recognized, at least until more material is available, as a distinct species. The conspecificity of the Hagerman fossil *Clemmys* and *C. owyheensis* is strengthened by their occurrence in the same drainage system, the Idaho Lake system. Temporally, these two *Clemmys* may be separated by as much as 5.5 million years.

The nuchals of *C. owyheensis* differ from those of *Malaclemys* and the *Chrysemys floridana* group by an extensive nuchal scute underlay and from all *Chrysemys* by a proportionately narrower nuchal scute. The *Clemmys* nuchal can be distinguished from that of *Emydoidea*, because in the latter the anterolateral border of the first vertebral scute is rarely impressed on the bone. If the sulcus of vertebral scute is present, it lies completely posterior to the greatest width of the bone. In *Terrapene*, the anterolateral tips of the first vertebral scute do not extend beyond the margin of the nuchal bone. The fossil nuchals fall into the range of variation seen in *Clemmys*, but cannot be assigned to any particular extant species. Dorsally the fossil nuchals match the appearance of those of *C. guttata* and *marmorata* with the anterolateral corners of the first vertebral scute extending off the nuchal onto the first peripheral. In *C. insculpta*, these corners do not approach the edge of the nuchal closely, whereas the corners in *C. muhlenbergi* end at the edge as in *Terrapene*. Ventrally the nuchals of *C. owyheensis* possess a long nuchal scute underlay as in *C. insculpta* and *guttata*.

The pygals of *C. owyheensis* are bifurcate posteriorly and have posteriorly converging lateral sides. Only *C. m. marmorata* possesses this condition; all other *Clemmys* have only a shallow nick. In *Chrysemys*, pygals with deep notches have parallel or posteriorly diverging sides.

The epiplastra from Hagerman have the deep gular overlay and thick gular lip characteristic of *Clemmys*. The anterior edge of the gular lip is smooth and bordered laterally by a distinct horn on each side. Likewise, the fossil hyoplastra are from *Clemmys*, for they have an anterior humeropectoral sulcus. On the hypoplastra of *C. owyheensis*, the abdominomarginal sulcus coincides with the hypoplas-troperipheral suture, and a deep groove extends posteriorly from the inguinal buttress along the abdominal and femoral scutes onto the xiphiplastron. The condition of the hypoplastron is commonly observed in *Clemmys*. Each xiphiplastron also possesses a deep dorsal groove, and in addition the transition laterally between anal and femoral scutes is smooth, i.e., no step is formed.

DISCUSSION AND SUMMARY

The Hagerman chelonian fauna consists of two species, *Chrysemys idahoensis* and *Clemmys owyheensis*. No turtles occur in this region today, although Stebbins (1954,192) lists an unconfirmed report of a *C. marmorata* from Eagles Nest, Idaho, which is upstream of the Hagerman locality. If this record is excluded, the closest

Clemmys population is *C. marmorata* in the Truckee and Carson rivers of Nevada. It has been suggested that the Nevada population is introduced; however, two factors hint that it may be a natural population. Although *C. owyheensis* shares some characteristics with the eastern species of *Clemmys*, it appears to be closely related to *C. marmorata*. Furthermore, the absence of inguinal scutes on the fossil hypoplastra indicates that the Hagerman *Clemmys* are related to the southern race of *C. marmorata*. Other aquatic animals, mollusks (Taylor, 1966) and fish (Miller, 1965), show this relationship between faunas of southern Idaho and central California. This has led to the postulation of a different drainage pattern for the Snake River during the Pliocene and most of the Pleistocene. The course of the river was from southeastern Oregon across northwestern Nevada to central California. Thus the Nevada population of *C. marmorata* may be a relict as its present distribution coincides with this old drainage pattern.

The shell elements of the Hagerman turtles were obtained from several localities representing a temporal span of about 100,000 years (Fig. 1). *Clemmys* occur throughout this entire temporal span. In contrast, unquestionable remains of *Chrysemys* are clustered around the Horse Quarry (Fig. 1). This is a strange occurrence, for the buttress-like inferior parietal process and broad alveolar surfaces of *C. idahoensis* indicate that this taxon was molluscivorous. Taylor (1966) reported the near absence of mollusks from this stratigraphic position. Accordingly, if *C. idahoensis* were entirely molluscivorous as has been suggested for the minnow, *Mylocyprinus* (Uyeno, 1961), it should also be absent from the Lake Idaho fauna of that time and would be expected to occur earlier in association with the abundant mollusk fauna.

At the present, *C. idahoensis* has been found in Kansas and Idaho. This distribution is not matched by either of its suggested relatives, *rubriventris* (Gilmore, 1933) or *scripta*. The geographic proximity of *C. scripta* attests to the likelihood of *C. idahoensis* being a derivative of the *scripta* lineage rather than the Atlantic coastal plain *rubriventris*. The cranial characteristics of *C. idahoensis* also seem to be more similar to *scripta* than *rubriventris*.

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ELEVATION (ft.)	CHRYSEMYS	CLEMMYS	STRATIGRAPHIC MARKER
3400		X	
50			
3300	X ★ X	X	Horse Quarry
50	X		
3200		X	
50		X X	Basalt 3.48 million years
	?	X	
3100		X	
50		X	
		X	
3000		X	Peters Gulch Ash
50		X	
2900			

Figure 1. The stratigraphic distribution of *Chrysemys idahoensis* and *Clemmys owyheensis* in the vicinity of Hagerman, Idaho. The elevation is the height of fossiliferous strata above sea level. X, specimen(s) in the University of Michigan Museum of Paleontology; star, the type specimens of *C. idahoensis* (USNM 12059-60).

by their editorial comments. Dr. P. Bjork greatly aided the preparation of the figure.

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