

**Article IX.**—ON TWO INTERESTING GENERA OF EOCENE TURTLES, CHISTERNON LEIDY AND ANOSTEIRA LEIDY.

By OLIVER P. HAY.

The genus *Chisternon* was proposed in 1872 by Dr. Joseph Leidy (Proc. Acad. Nat. Sci. Phila., p. 162) for the reception of his earlier described *Baëna undata*. The character which led Dr. Leidy to found the genus was the presence of a pair of mesoplastral bones. At that time the presence of the same bones in *Baëna arenosa*, the type of the genus *Baëna*, had not yet been observed. When these had been discovered in the species just mentioned, by Cope, in 1884, there appeared to be no reason for retaining *Chisternon*.

Recently the writer has been studying the species of the Baënidæ, and he has found, as he thinks, sufficient reasons for reviving Leidy's *Chisternon*.

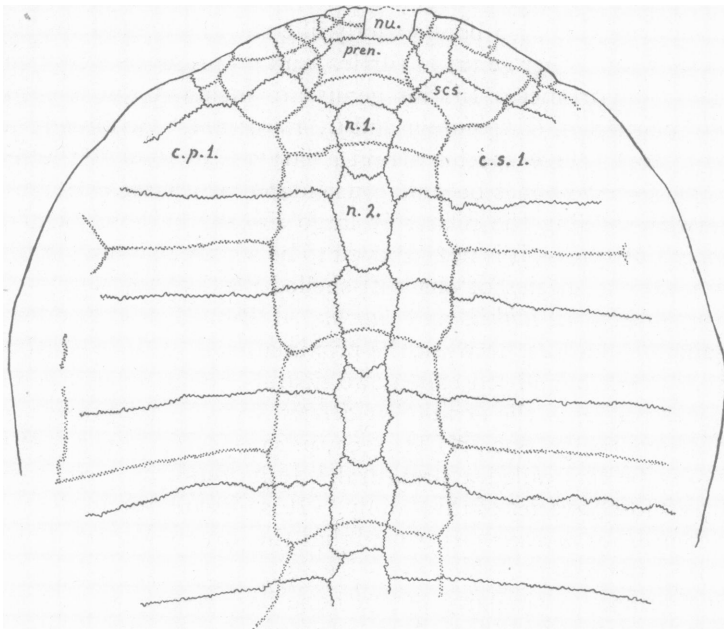


Fig. 1.—*Chisternon hebraicum* Leidy. Portion of carapace. *c. p. 1.*, first costal plate; *c. s. 1.*, first costal scute; *n. 1.* *n. 2.*, first and second neurals; *nu.*, nuchal bone; *pren.*, preneural; *scs.*, supernumerary costal scute.

In such specimens of *Baëna* as have not the sutures wholly obliterated by coössification of the bones it is seen that the nuchal bone

is followed immediately by the first neural, the normal condition in the vast majority of turtles, living and extinct. In *Chisternon undatum* and *C. hebraicum* a different condition prevails. Figure 1 represents a portion of a large carapace of *C. hebraicum* which was secured in the Bridger beds of Grizzly Buttes, Wyoming, in 1903. This carapace was accompanied by the complete plastron and a fine skull. Figures of this skull have been published by the writer (Bull. Amer. Mus. Nat. Hist., XXI, 1905, pp. 138, 139, figs. 1-3) under the name *Baëna undata*. This was done before the writer had observed the differences between *Chisternon* and *Baëna* and those between the two species of *Chisternon*.

In the carapace here figured the sutures between the bones are all open and easily traced. In Figure 1 the sutures are represented by the zigzag lines; the boundaries between the horny scutes, by the dotted bands. It will be observed that the nuchal bone, only half of which is present, is very narrow from front to rear. Immediately behind it comes a large hexagonal bone; and this is followed in turn by the first neural. No bone exactly like the one behind the nuchal is known in any other genus of turtles, and its presence is regarded as of generic importance. In this genus are included the two species already mentioned, *C. undatum* and *C. hebraicum*. As already noted by Prof. Cope, these species attain a larger size than do the species of *Baëna*, and the bones become consolidated at a later period of life.

Notwithstanding the relatively large size of the bone behind the nuchal of *Chisternon*, it is not believed to be wholly new among turtles. In three living species of the soft-shelled turtles, the Trionychidæ, *Trionyx gangeticus*, *leithii*, and *hurum*, of Boulenger's 'Catalogue of Chelonians,' there are, between the proximal ends of the costals of the first pair, what have been called two neurals. On this character the writer has proposed the genus *Aspideretes*, with *T. gangeticus* as type (Proc. Amer. Philos. Soc., XLII, 1903, p. 274). The anterior of these two bones he has called a preneural. It is found in a considerable number of fossil species of this family. It is present also in the trionychoid genus *Plastomenus*. It is held that the presence of this bone is a primitive character.

Furthermore, a similarly placed bone has recently been found in a species of the Baenidæ. Not long ago Mr. L. M. Lambe published and figured *Baëna pulchra* from the Judith River deposits of Alberta, (Ottawa Naturalist, XIX, 1906, p. 189, pl. iii, fig. 4). Between the nuchal and the first neural is seen a short bone, as wide as the neural; and this must be the homologue both of the

preneural of the soft-shelled turtles and of *Chisternon*. *B. pulchra* certainly is the representative of a new genus and has been more recently published as such. (*Boremys*, Ottawa Naturalist, XIX, p. 232.) It appears reasonable to conclude that all the genera which possess this preneural have inherited it from common ancestors of a much earlier time.

In the figure of the carapace of *Chisternon* it will be observed that there is a supernumerary costal scute on each side, such as is found in the living loggerhead turtle. This is not uncommon in the Baenidæ. Besides this, in *Chisternon* there is a supernumerary vertebral scute which occupies most of the area of the preneural and a portion of the nuchal.

One of the most beautiful of fossil turtles is *Anosteira ornata*, of the Bridger Eocene. A figure of a moderately well preserved specimen was published by Dr. Leidy in his 'Contributions to the Extinct

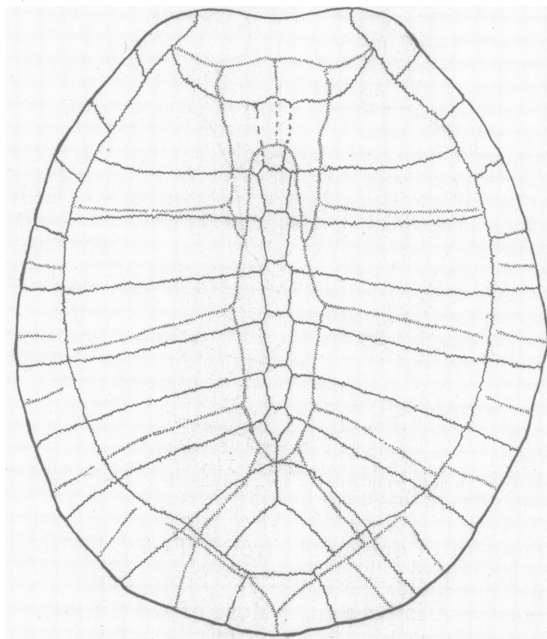


Fig. 2.—*Anosteira ornata* Leidy. View of Carapace.  $\times \frac{3}{4}$

Fauna of the Western Territories,' plate xvi. The systematic position of this genus has been very doubtful. Dr. Leidy regarded it, with *Baëna*, *Chisternon*, and *Baptemys*, as intermediate to the Pleurodira and the snapping turtles, Chelydridæ. Cope arranged

it among the members of the family last mentioned. Lydekker places the genus in the subfamily Anosteirinae, a division of the Chelydridae. Baur believed that it belonged either with the Staurotypidae (which he separated from the Dermatemydidae), or with the Kinosternidae.

During the past summer the American Museum expedition to the Bridger basin obtained at Henry's Fork a nearly complete specimen of this species. It lacked only the neurals, a part of the left

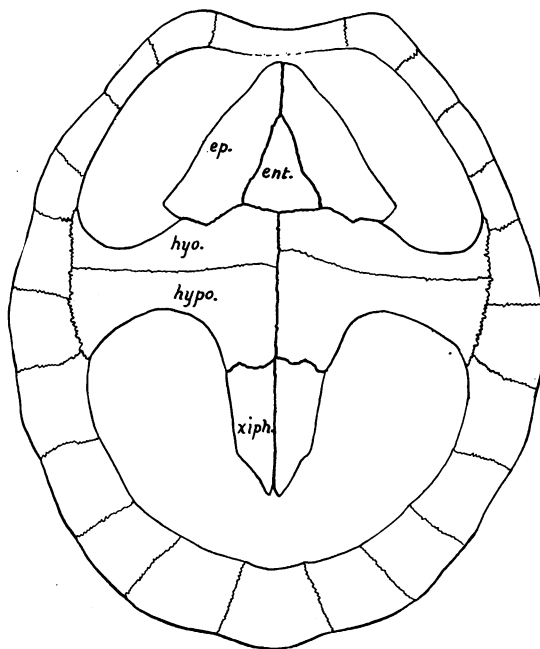


Fig. 3.—*Anosteira ornata* Leidy. View of plastron.  $\times \frac{3}{4}$ . ent., entoplastron; ep., epiplastron; hypo., hyoplastron; hypoplastron; xiph., xiphiplastron.

side, and a fragment of one epiplastron. From this specimen mainly has been constructed Figures 2 and 3. From Figure 3 it will be seen that the entoplastron is present. Most of the bones of the plastron are joined by rather loose sutures. The plastron resembles closely that of *Staurotypus salvinii*, but in the latter the bones are joined by very jagged sutures. There can now hardly be any doubt that *Anosteira* belongs near *Staurotypus* and *Dermatemys*, genera confined to Central America.

Some extremely interesting structures are to be observed on the

carapace. Hitherto little has been known regarding the horny scutes. Dr. Baur showed that on some of the bones there were traces of the sulci. In the specimen figured here most of the scute areas can be determined. Mainly on account of the sculpture, the nuchal and the anterior marginal scutes cannot be mapped out. The vertebral scutes are strangely modified. Usually in turtles a sulcus crosses the first neural and divides the first from the second vertebral scute. In *A. ornata* there is no trace of this sulcus. The sulcus between the second and the third vertebral scutes starts on each side as usual; but instead of crossing on the third neural, it is carried forward and crosses on the first neural. The explanation of this condition appears to be that the first and second vertebrals have coalesced and the third has been pushed forward medially as far as the original boundary between the first and second. This arrangement has been observed on two specimens of the species. Furthermore, a median sulcus starts at the front of the first vertebral and runs backward to the hinder border of the nuchal bone. The first neural not being preserved, it is impossible to say whether or not the sulcus continued backward to the loop referred to above. It probably did. In that case, the coalesced first and second vertebrals would be divided into right and left halves.

Also, the third and the fourth vertebrals appear to have coalesced; for no trace can be found of a sulcus crossing the fifth neural, where it is to be expected.

At the rear of the carapace may be seen the sulci bordering the marginal scutes above, but these cannot be seen along the sides and in front. Probably they followed closely the costo-peripheral sutures.

No traces are to be found of sulci on the plastral bones. No doubt these too were covered by horny scutes, but they must have been thin and delicate and they left no impressions on the bones.

The nuchal bone of this genus possesses no costiform processes, such as are to be seen in *Staurotypus*. Nevertheless, the writer does not hesitate to place *Anosteira*, *Staurotypus*, and *Dermatemys* in the same family. The genera *Adocus* and *Agomphus* are to be associated with them. *Pseudotrionyx* Dollo of the Middle Eocene of Belgium, without doubt, is closely related to *Anosteira*. In some of these the costiform processes may be regarded as either rudimentary or vestigial. The writer does not believe that the primitive turtles possessed these processes.

*Anosteira anglica* has been described by Mr. R. Lydekker from the Oligocene of England. The specimens figured resemble more *Pseudotrionyx delheidi* Dollo, of the Middle Eocene of Belgium.

There can be no doubt that *Pseudotrionyx* is closely related to *Anosteira*.

In a review of Lydekker's 'Catalogue of Fossil Reptiles' Prof. Cope, in 1891 (*Amer. Naturalist*, XXV, p. 645), assumed that the family name *Dermatemydidæ* had been proposed by Lydekker, in 1889. This was an error. The name *Dermatemydæ* was used by Gray in his 'Supplement to the Catalogue of Shield Reptiles,' 1870, page 49. As this was probably issued before Cope's paper in which he used the name *Adocidæ*, it is incumbent to employ Gray's term.

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