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The PLASTER JACKET is a newsletter about fossil vertebrate animals of Florida. Its purpose is to circulate authoritative material on vertebrate paleontology and to foster communication among the growing number of enthusiasts of this subject.

Questions, announcements and other communications are solicited from all readers. Information of general interest will be included in future issues.

It is our intent to produce this series at the rate of about one issue per quarter year. We hope to add as many genuinely interested paleontologists as possible to our mailing list. If you are interested please send your name and address to the PLASTER JACKET. These issues are distributed free of charge to all interested people.

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#16

# THE PLASTER JACKET

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# FOSSIL TURTLES

by

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The exact origin of turtles in regard to time, place, and ancestors is clothed in ignorance. Though several different reptile groups have been suggested as ancestors, turtles probably evolved from colylosaurian reptiles in late Paleozoic times. Studies of living and fossil turtles suggest that the major evolutionary step from an as yet unknown ancestor to "turtle" undoubtedly took place at the interface between land and water in freshwater marshes. A boney armor in the skin, composed of many pieces, each covered by enlarged scales, was probably already present in these ancestors. These were fused into a large mass protecting both the top and bottom of the early turtles. All the remaining evolution of the shell reflects a steady reduction of boney pieces: primitive turtles have more shell elements than later types.

The earliest undoubted turtles are known from Upper Triassic deposits of Europe. Of the two families represented, Proganochelyidae and Proterochersidae, the former is more primitive and undoubtedly similar to the ancestral "preturtle". The latter is a more "typical" turtle, and is probably closer to the ancestry of later types. These two early families, in addition to other extinct Mesozoic and early Tertiary ones, form the completely extinct evolutionary base (Suborder Amphichelydia) of all living turtles. From this base in the Mesozoic the rather primitive "side-neck" turtles (Suborder Pleurodira) were evolved. Though widespread in the past, today they are restricted to fresh water in South America, Africa, and Australia. All the rest



of the living turtles of the world fall into the remaining group (Suborder Cryptodira), which includes many secondarily degenerate types (sea turtles, soft-shells, etc.). All the known fossil turtles of Florida belong to this last Suborder.

## Family Trionychidae

Turtles have a longer history in Florida than any other vertebrates - due to the lucky recovery of soft-shell turtle bones from an oil well core into Triassic rock, 3,000 feet below the surface in southern Florida. These fossils, as well as many later soft-shell remains, have not been studied in detail. The entire group needs attention, but accurate identification is difficult without skull material. Modern species probably extend well back into the upper Tertiary. Skulls and associated shell and limb elements from the McGeehee Farm (Pliocene) are referable to Trionyx ferox, the living species found throughout most of the state. However, other species are expected to be identified as more evidence is studied. Identification to the genus Trionyx is simple on the basis of the golf ball-like dimpled surface of all shell bones.

## Family Chelonidae

Sea turtles have a long history, extending into the Mesozoic. In our area they are often quite common in marine deposits, though usually fragmentary. Without limb or jaw elements it is apparently impossible to identify them much closer than "sea turtle". This is most often done on the characteristic sculpturing of the pleural bones and the very loose, groove-like attachment between the rib ends of the shell and the peripherals.

## Family Chelydridae

Of all living turtles, the family containing

the Snapping and Mud Turtles has the longest fossil history, extending into the Upper Jurassic in Europe. All living Florida genera are known as fossils, though they have undergone extensive changes in distribution. Chelydra serpentina (Common Snapper) is abundant in some Pleistocene localities. Habitat preferences are broad, so that its fossil presence indicates little except that fresh water occurred there. Two species of the closely related Alligator Snapper (Macrochelys) are known from Florida: M. auffenbergi, widely distributed in the Florida Pliocene, and the living M. temmincki, restricted to rivers from the Suwannee westward, but farther south in Pleistocene river deposits. The two species can only be separated on the basis of complete skulls or toes.

Mud and Musk Turtles (Kinosternon and Sternotherus) are known from several Florida Plio- and Pleistocene deposits, but none of the material has been studied. The genera are separable on the basis of certain elements of the lower shell, but whether fossils can be identified to the species level is not clear.

Family Emydidae

This family, including the Pond and Box Turtles, is the best represented by fossils in Florida, with many deposits containing large numbers. Fortunately some of the genera are well studied.

Clemmys guttata (Spotted Turtle) lives only in a few scattered localities in northern Florida, suggesting that the past distribution was probably much more extensive. I would expect it to occur in at least Pleistocene swamp deposits, but its presence has not been established.

Graptemys barbouri (Barbour's Map Turtle) and other species in the same genus presently occurs



only in large rivers from the Apalachicola westward. However a few Pleistocene fossils from the Suwannee and its tributaries show that it was more widespread in the past. It is separated from Chrysemys concinna with difficulty (below).

The genus Chrysemys (including Pseudemys) is represented by five living Florida species. C. picta (Eastern Pond Turtle) just barely enters the state in the Apalachicola River Valley. No fossils are known, but it can be expected farther south in Pleistocene deposits.

Chrysemys concinna (Suwannee Cooter) and C. floridana (Florida Cooter) are closely related, and seem to have evolved in the mid-Tertiary; probably in southeastern United States. The latter has a closely related, but as yet unstudied representative in the Miocene of Florida. C. floridana occurs in all types of aquatic deposits, except large rivers along the Gulf Coast, which are inhabited by C. concinna. The latter evolved from C. williamsi, a Pliocene river species from northern Florida. C. concinna is known from a number of Pleistocene river deposits in the western part of the peninsula, C. floridana from many deposits all over the state. The two species lack shell sculpturing and can only be separated on scale details. With C. nelsoni and C. scripta (below) C. floridana is the most common turtle fossil in the Pleistocene of Florida.

Chrysemys scripta (Yellow-eared Slider) and C. nelsoni (Nelson's Slider) are closely related common turtles in Florida Late Pleistocene deposits. Shells of both are heavily sculptured, but easily identified on details of particularly the proneural bone (Fig. 3). They probably diverged in the mid-Tertiary. At present C. scripta extends south to about Gainesville, C. nelsoni north to about the same level. However in Late Pleistocene scripta

ranged south to Lake Okeechobee, whereas nelsoni extended farther north than it does at present. Whether these range changes are correlated with Pleistocene climatic shifts is unknown. Both have Pliocene ancestors: C. carri leads to nelsoni and C. inflata to C. scripta. In addition, Early Pleistocene deposits harbor a form somewhat intermediate between the last two (C. platymarginata). The entire scripta series (fossil and modern) are often placed in a separate subgenus (Trachemys), in which Pleistocene giganticism is typical.

O. P. Hay, a vertebrate paleontologist of the early part of the 20th Century, described many fossil Florida turtles from small fragments, including a number placed in Chrysemys. Most are Late Pleistocene and undoubtedly synonyms of the living species. However the relationships of several others, such as the Pliocene C. caelata remain obscure.

Deirochelys reticulata (Chicken Turtle) is a small turtle characteristic of shallow water situations. Shell sculpturing is evident, sometimes similar to that in C. nelsoni and scripta, but details in particularly the proneural bone will usually separate them. It is known from several Pleistocene deposits in northern Florida, and during that time attained much larger size than at present.

Florida fossil Box Turtles (Terrapene carolina) have received much attention because geographic variation of living populations is easily traced in Pleistocene populations. Pliocene fragments are known, but are insufficient for analysis. They are very common in Pleistocene beds and are often found entire, including the skull and entire limb skeletons. Giganticism is typical in Pleistocene coastal populations. Generic identification aids include the plastral hinge, allowing complete closure of the shell, and the fact that in adults all bones of the shell are fused together.



## Family Testudinidae

This family, composed only of land tortoises, is very closely related to the Emydidae. The only living Florida land tortoise is the Gopher Tortoise (Gopherus polyphemus). Pleistocene deposits often contain remains of this thin-shelled turtle. Entire skeletons have been obtained in a few localities. Certain Pliocene deposits contain a gigantic species; its relationship to G. polyphemus remains obscure.

Floridemys nanus was known from a single land tortoise shell of diminutive size, collected from Central Florida deposits originally estimated to be of Pliocene age. Additional fragments now available suggest a Miocene age. It is probably closely related to Stylemys. The latter, so common in Oligocene-Miocene deposits of western United States, has recently been discovered in Oligocene pockets in northern Florida. All these fragments remain unstudied.

Geochelone is a very widely dispersed genus of land tortoises, and includes such giants as the Galapagos Tortoise. Giganticism of this type is typical of several different evolutionary lines within the genus. Becoming extinct in North America in the Late Pleistocene, they are common in Tertiary and Pleistocene deposits in Florida. Two major evolutionary lines are recognized, each with several species. Details of Florida fossil land tortoises of this genus will be the subject of a future P. J.

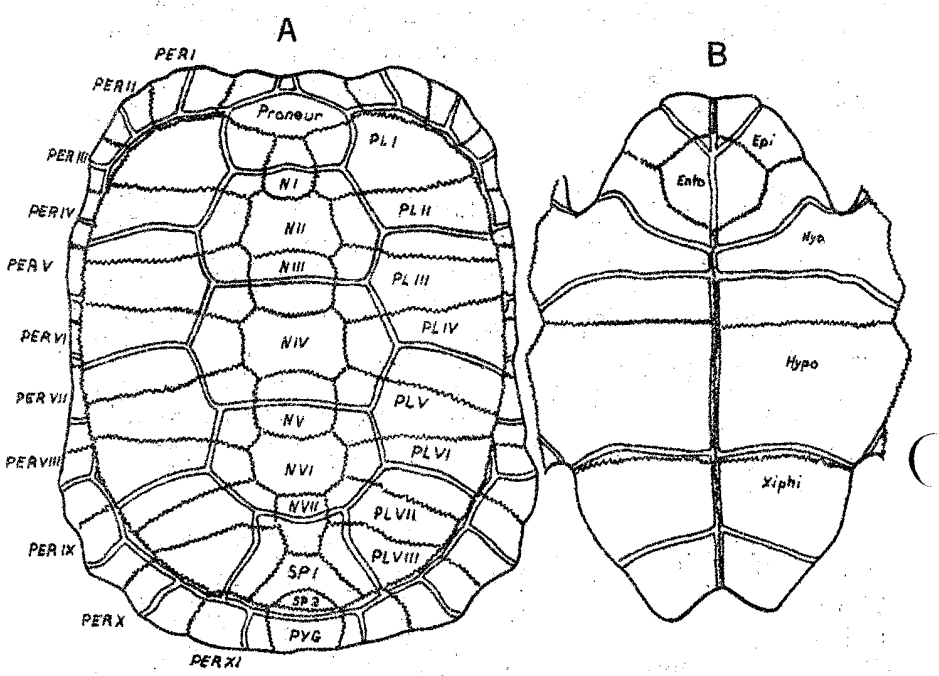


Figure 1.- Tortoise shell bones. Bones of the upper (A) and lower (B) shell of a typical turtle (Geochelone crassiscutata, Pleistocene, Florida). Abbreviations: PER, peripherals; PL, pleurals; Proneur., proneural; N, neurals; SP 1, SP 2, suprapygals; PYG, pygal; Epi, epiplastron; Ento, entoplastron, Hyo, hyoplastra; Hypo, hypoplastra; Xiphi, xiphiplastra.



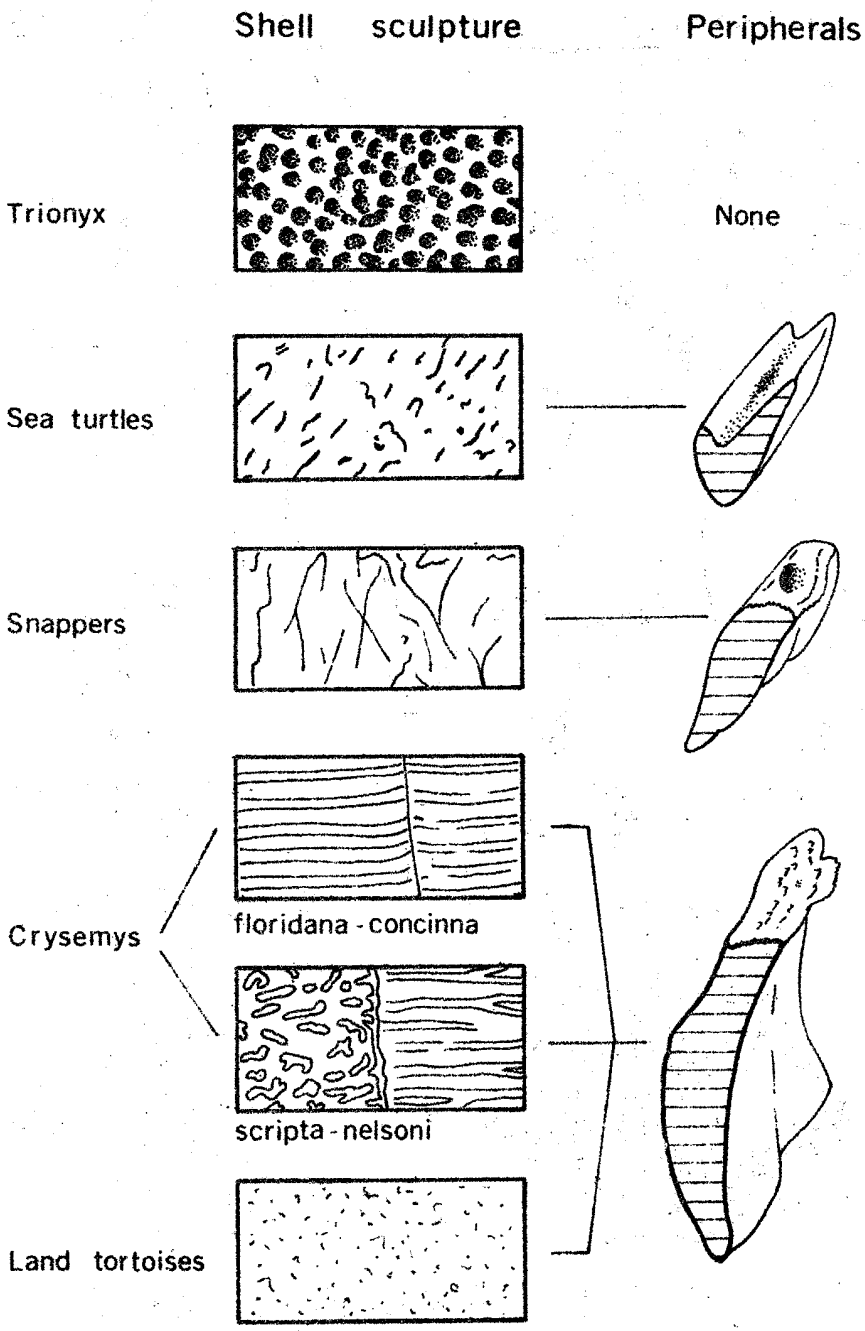


Figure 2

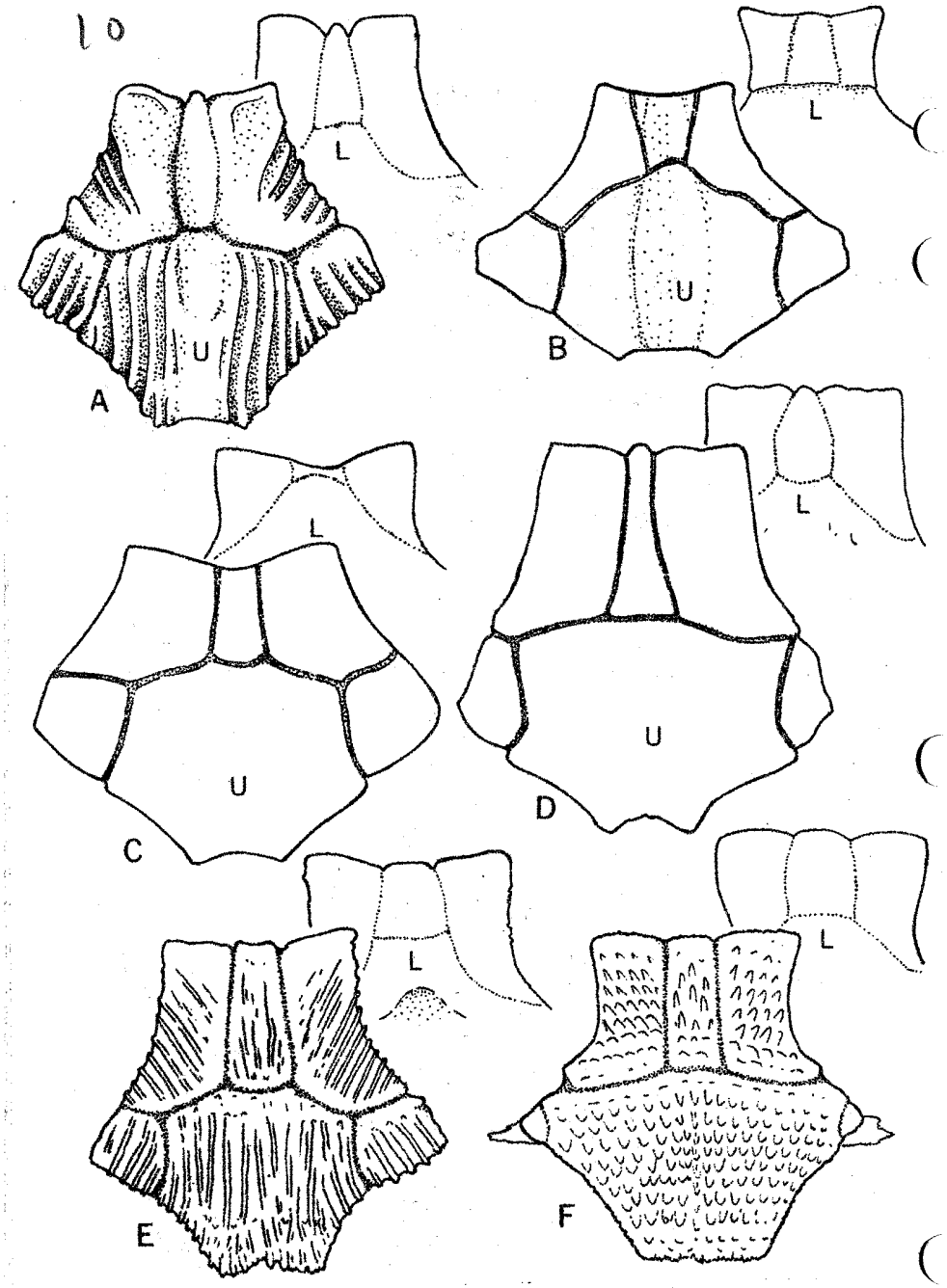


Figure 3.- Proneurals are often the most useful of all shell bones in separating fossil emydid turtles. A.) Chrysemys scripta, B.) Terrapene carolina, C.) Chrysemys concinna, D.) Chrysemys floridana, E.) Chrysemys nelsoni, F.) Deirochelys reticulata. U = upper, and L = lower surfaces of proneurals.



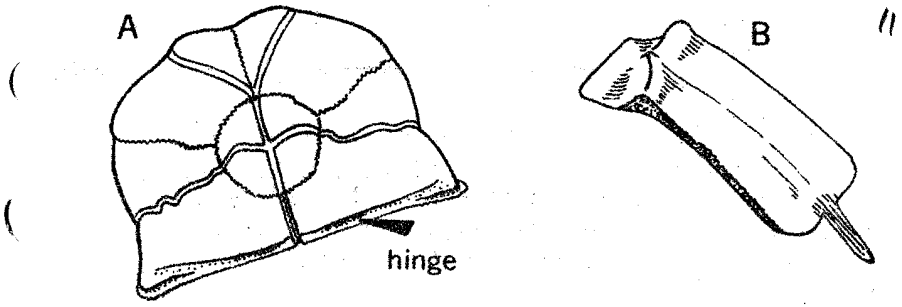


Figure 4.- A.) Terrapene carolina. Front lobe of lower shell (bones fused). B.) Chelydra and Macrochelys possess a large keel on the pleural bones.

GEOLOGICAL DISTRIBUTION OF TURTLE GENERA FOUND AS FOSSILS IN FLORIDA

| Taxa | Mesozoic | | Cenozoic | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Paleoc. | Eoc. | Olig. | Mioc. | Plio. | Pleist. |
| CHELYDRIDAE | | | | | | | | |
| Chelydra | | | | | + | + | F | F |
| Macrochelys | | | | | | | F | F |
| Kinosternon | | | | | + | + | F | F |
| Sternotherus | | | | + | + | F | F | F |
| EMYDIDAE | | | | | | | | |
| Clemmys | | | | | | | | ? |
| Chrysemys | | | | | + | F | F | F |
| Graptemys | | | | | | | + | F |
| Terrapene | | | | | | | F | F |
| TESTUDINIDAE | | | | + | F | F | F | F |
| Geochelone | | | | | | F | F | F |
| Gopherus | | | | | | | F | F |
| Floridemys | | | | | | F | | |
| Stylemys | | | | + | F | F | | |
| CHELONIIDAE | + | + | | + | + | F | F | F |
| Chelonia | | | | | | ? | F | F |
| Caretta | | | | | | | F | |
| Lepidochelys | | | | | | | F | |
| TRIONYCHIDAE | F | + | | + | + | + | F | F |
| Trionyx | + | + | | + | + | F | F | F |

F = Florida records
+ = Records outside Florida