

The Status of the Turtle *Graptemys oculifera* (Baur)<sup>1</sup>

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(Text-figures 1-9)

THE status of *Graptemys oculifera* (Baur) has been in question since it was described in 1890. The only available specimens have been those originally deposited in the United States National Museum. Possibly the absence of additional material has been the major reason why herpetologists have questioned the existence of this form.

Although Stejneger had available all of the known specimens, in the 1933 *Check List of North American Amphibians and Reptiles* by Stejneger & Barbour this form was listed as *Graptemys pseudogeographica oculifera*, whereas it was referred to as *Graptemys oculifera* in the 1943 edition. Carr (1949) refers to it as follows: "Two forms of *Graptemys*, *oculifera* and *kohni*, were described by Baur from the Gulf Coast. It appears that but one of these has real taxonomic existence, the other being a variant which may approximate the phenotype of a central Texas form described by Stejneger as *G. p. versa*. The characters of the bulk of the Gulf Coast population are such that as a whole it is clearly referable to Baur's *kohni*, while the variant represents his *oculifera*." Unfortunately, Carr had not had an opportunity to study material from the streams of that part of the Gulf Coast between western Florida and extreme eastern Louisiana, an area occupied by *Graptemys* distinct from the *pseudogeographica* complex. One of these, *Graptemys pulchra* Baur, is closely related to *Graptemys barbouri* Carr (Cagle, 1952) and the other, *Graptemys oculifera* (Baur), is one of the most distinctive species of the North American fauna.

Baur found the specimens on which he based *G. oculifera* in a group of turtles shipped to

the National Museum by Gustave Kohn of New Orleans. The origin of the specimens is somewhat questionable and this is significant in defining the range. The turtles were reportedly from Mandeville, Louisiana, and Pensacola, Florida, but were probably purchased in the French Quarter Market in New Orleans. This is indicated by a statement of Beyer (1900). In referring to *G. oculifera*, he states, "A handsome species, occurring in the marshes of southwestern Louisiana, whence it is brought to the French Market, New Orleans, along with shipments of other turtles, and where Mr. Kohn secured the specimens in his collection." The reference to southwestern Louisiana is puzzling as intensive collecting has produced no *G. oculifera* from that area. However, the species is abundant in the Pearl River in southeastern Louisiana. Either Beyer was confusing *G. oculifera* and another species or this is a typographical error. Beyer, Curator of the Tulane Museum, worked closely with Kohn, a private collector, and was probably well informed.

Kohn retained eight specimens of *G. oculifera* in his private collection, which he eventually contributed to Tulane University. One of these (Tulane 7628) is recorded as being collected at Pensacola, Florida, May, 1888.

Turtle collecting in southern Alabama and Florida has failed to produce a specimen of *G. oculifera*. The records from Pensacola must be considered erroneous until additional material is available. It may be assumed that Kohn accepted the locality data of the person from whom his purchase was made. Baur selected the specimens from Mandeville, Louisiana, as types but did not designate his specimens other than stating, "Such specimens are also in the collection of the Smithsonian Institution, Washington, D. C. sent by Mr. G. Kohn, No. 15,511, etc." Baur obviously based his description on U.S.

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N.M. specimens 15508, 9, 10 and 11. No. 15511 is entered in the U.S.N.M. catalogue as "Cotype" and under the remarks column is entered "Type, Science, Nov. 7, 1890, p. 262." Specimen No. 15510 was sent to the Museum of Comparative Zoology, Harvard University, where it is catalogued as No. 6430 from near New Orleans, La., collector George Baur, 1895, and is labeled as the type. All four specimens must be considered as cotypes. It is assumed that they were taken from the Pearl River, 26 miles east of Mandeville, as there is no suitable habitat for these turtles in the immediate vicinity of Mandeville.

Baur, much impressed with his specimens, remarked that it was one of the most beautiful of American tortoises. His description emphasizes these characters:

carapace broader and higher and bony tubercles more developed than in *M. lesueuri* (= *G. pseudogeographica*).

each shield of the carapace with a yellow ring, bordered on the inside and outside with dark olive-brown.

plastron yellow.

head with a large yellow spot behind the eye, two yellow stripes from the orbit backwards and a very characteristic yellow stripe covering the whole lower jaw.

This combination of characters separates *G. oculifera* from the other Gulf Coast *Graptemy*s. None of the species has a complete yellow ring on each costal shield bordered with olive-brown. *G. barbouri* may have C-shaped markings on the costals but they approximate the width of those in *G. oculifera* in only an occasional individual. The head markings of *G. oculifera* are not approached by those of any other turtle. *G. pulchra* does not have a transverse yellow band on the lower jaw. Neither *G. versa* nor any of the members of the *G. pseudogeographica* complex approach the description given by Baur. The original description remains an adequate diagnosis.

The emphasis Baur placed on the distinctiveness of this turtle made all the more puzzling its absence from collections and the failure of Tulane field crews to collect the turtle in 1947 and 1948. Repeated attempts to collect it in the Florida Parishes of Louisiana and southern Mississippi failed, and local biologists and fishermen insisted that there were no such animals in Louisiana or Mississippi. The decision was made that *G. oculifera* was nonexistent in the region of the type locality. Then, during the recataloging of the Gustave Kohn collection, which has been stored for many years in the Tulane Museum, a series of dried specimens was found.

Some of these were labeled "Pearl River" and field crews were again dispatched. Operation of hoop nets and trot lines failed to produce a single map turtle, but fortunately one student found a female crawling ashore to nest. The collecting of this specimen stimulated a renewal of efforts which were successful when Mr. A. H. Chaney found that these turtles could be readily collected at night from their resting places just under the water surface (Chaney & Smith, 1950). With one man operating the motor of a 12-foot skiff and another "grabbing" turtles from a position in the prow, a number of specimens were taken.

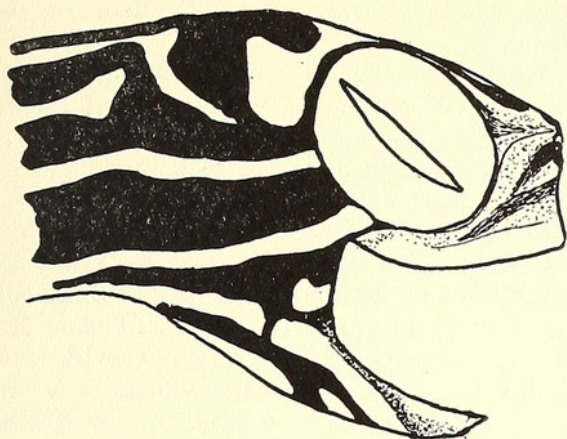
I am especially grateful to Messrs. A. H. Chaney, Clarence Smith, Paul Anderson, John Boley, Ernest Liner and Samuel Nichols for their enthusiastic collecting which provided this series of specimens.

*Description.* — A supplementary description based on this series will emphasize the distinctiveness of this form and furnish a description of the young. A total of 66 specimens including hatchlings, juveniles and adults of both sexes are deposited in the Tulane Collections. The abbreviations used are: Pl — maximum plastron length; Hw — maximum head width; Aw — alveolar width of upper jaw, maximum measurement; Cw — maximum carapace width; Cl — maximum carapace length.

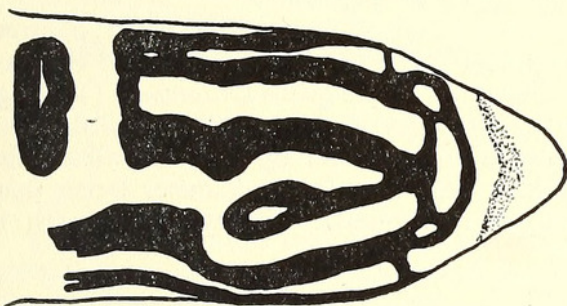
*Juveniles.* — This composite description is based on 10 individuals (Tulane 11667-3, 11960, 12100, 12103, 12285, 12289, 12418, 12457, 14008, 14009) from the Pearl River. The smallest (Tulane 11960) is a hatchling and the largest (Tulane 12285) is in its first season of growth. The most unusual feature of this series is the remarkable uniformity of morphology and color pattern. Local samples of other species of *Graptemy*s are typically very variable.

The head pattern consists of two wide, yellow, longitudinal lines, one entering the orbit and the other terminating between the eye and the rear of the upper jaw shield. A transversely elongated spot immediately posterior to the orbit may or may not be connected to a longitudinal line extending from the spot or its vicinity posteriorly onto the neck (Text-fig. 1). A single mid-dorsal stripe extends between the orbits to terminate near the inner margins of the postorbital spots. This central line may be bordered laterally by a poorly defined, irregular line touching the upper edge of the orbit. The lower jaw has a sharply defined, transverse light band with black borders. The ventral surface of the neck is dominated by three wide longitudinal lines (Text-fig. 2). The yellow stripes of the head and neck are distinct on the generally black background color. The greatest variation

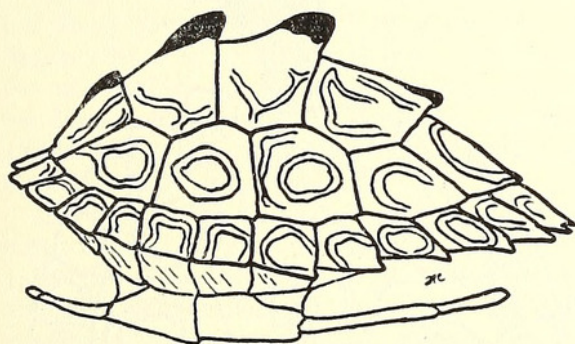




TEXT-FIG. 1. *Graptemys oculifera*. The head of a hatchling. The white areas, exclusive of the orbit, are yellow.



TEXT-FIG. 2. *Graptemys oculifera*. Ventral surface of the jaw and neck of a hatchling.



TEXT-FIG. 3. *Graptemys oculifera*. Lateral view of the carapace and plastron of a juvenile.

occurs in the postorbital marking, which may be an oval isolated spot, a comma-shaped line connecting with the dorsal neck lines or a drop-shaped mark connecting with the supra-orbital as well as the dorsal neck lines.

The carapace is olive to brown with each costal and marginal bearing a complete or near-complete circle of yellow or orange. The first and fifth vertebrals have curved longitudinal yellow marks and the other vertebrals exhibit irregular yellow areas or are immaculate. The vertebral spines are all tipped with black (Text-fig. 3).

The plastron and bridge are yellow with black bands on the rear edge of each shield.

The anterior surface of the front legs has two wide yellow bands, similar in width and color to the longitudinal neck stripes, extending from the 2nd and 4th toes onto the shoulder. Similar stripes are present on the upper surface of the rear leg but the pattern is supplemented by an additional thin line extending from the base of the 3rd toe.

The jaws appear to be effective as shearing instruments; the horny surface of the lower jaws fit smoothly within the downward-projecting edges of the upper. When the mouth is closed, the upper horny covering overlaps, and in lateral view, covers completely that of the lower. The head is narrow ( $Pl/Hw = 3.7-5.2$ ). The alveolar surfaces of the upper jaw are narrow ( $Hw/Aw = 4.2-4.9$ ) and are separated at the midline by a space nearly equal to the width of the alveolar surfaces.

The first four vertebrals bear spines equal in height (measured from tip to suture between the vertebral bearing the spine and the next posterior one) to the suture between the 1st and 2nd marginal. In some individuals the spines project rearward. (Text-fig. 4) The carapace width is greater than the carapace length in every individual. The projection of the posterior corner of each marginal beyond the anterior corner of that of the next posterior one gives the carapace a serrate outline. The 11th and 12th marginals are deeply emarginate (Text-fig. 5).

*Adult Males.* — This description is based on five males: one just entering its first season of sexual maturity (Tulane 12287) and four (Tu-

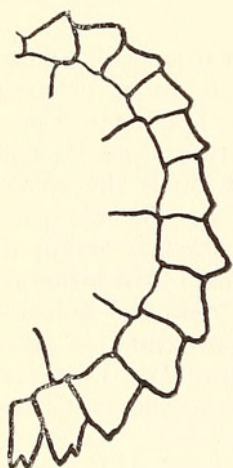


TEXT-FIG. 4. *Graptemys oculifera*. The variation in vertebral spines of three juveniles.



lane 12402, 12286, 12408, 12054) ranging in plastron length from 6.52-7.40 cm. The color pattern of the head, legs and carapace is as distinct as in juveniles except in the largest individual (12054) in which black color in the costals is beginning to obscure the brilliant yellow rings. The black pigment bordering the seams is diffused and reduced in contrast to the juveniles but essentially the same pattern is retained.

The jaws are not proportionately broader than in the juveniles but the scissors-action is accentuated by an increase in the tendency of the lower jaw to become spoon-like and for the horny edges of the upper jaw to become proportionately higher. The head is not broadened in relation to plastron length ( $Pl/Hw = 4.2-4.9$ ). The alveolar surfaces of the upper jaw are narrow ( $Hw/Aw = 4.2-4.9$ ).



TEXT-FIG. 5. *Graptemys oculifera*. The marginal plates of a hatchling.

The vertebral spines remain distinct, as in the juveniles, with the height of the 2nd spine equal to the length of the seam between the first and second marginal. The serrate appearance of the carapace outline so conspicuous in the juveniles is somewhat reduced in the smaller males and markedly so in the largest (Text-fig. 6). The nails of the forefeet are elongated (length of 3rd nail equal to length of seam between 2nd and 3rd marginal) except in the male just entering its first season of maturity.

*Female*. — An adult female (Tulane 12052; Pearl River, La., June 7, 1950; Cl 13.8 cm, Pl 13.2 cm, Cw 11.7 cm) retains the juvenile color pattern except on the plastron, where the black pigment is reduced. The bright yellow head markings are conspicuous against the black background (Text-fig. 7).

The horny edges of the upper jaw extend forward and cause the tip of the jaw to project well beyond the nostrils (Text-fig. 7). The head is but slightly broadened ( $Pl/Hw = 6.58$ ). The alveolar surfaces are broader in relation to

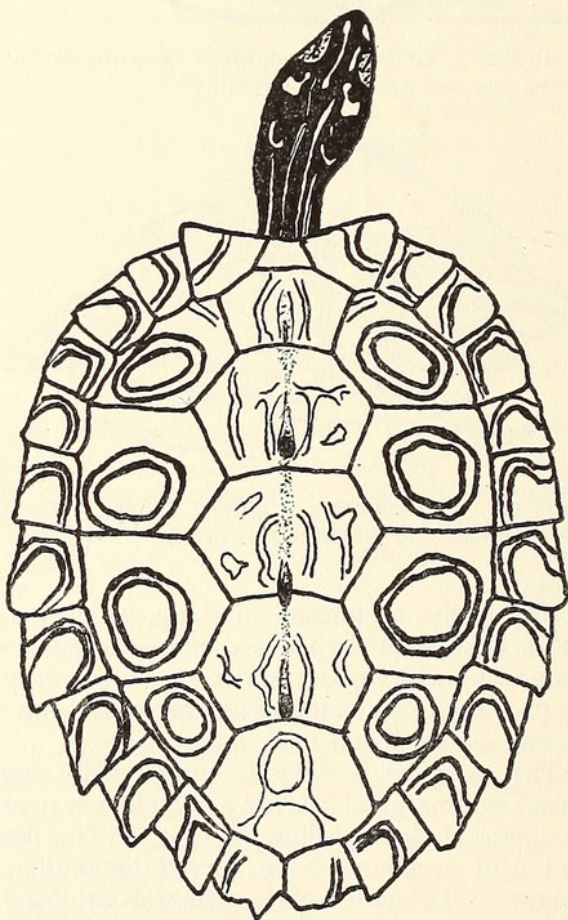
head width ( $Hw/Aw = 2.2$ ) than in the juveniles.

The vertebral spines are reduced. Those of the 1st and 4th remain as mere elevated ridges; those of the 2nd and 3rd are equal in height to  $1/3$  of the length of the seam between the 1st and 2nd marginal.

Eight females collected 1888-1892 and deposited in the Tulane Collection by Kohn are larger (Pl 14.0-20.0 cm) than any of those collected in recent years. The largest (Tulane 26) has these dimensions: Cl 21.5 cm, Cw 18.0 cm, Pl 20.0 cm. Each has a narrow head ( $Cw/Hw = 6.34-6.88$ ;  $Pl/Hw = 6.92-7.56$ ) and a wide carapace ( $Cl/Cw = 1.14-1.23$ ).

All retain the bright head markings of the juveniles but the yellow circles on the costal plates, although still distinct, are partially obscured by black pigment.

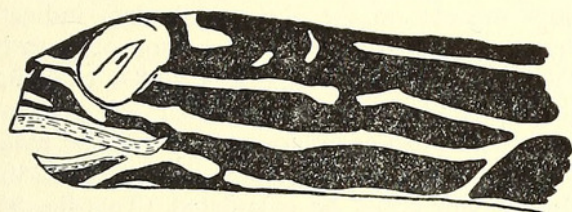
The skull of one female (Tulane 26; plastron length 20 cm) exhibits some unusual features for members of the genus *Graptemys* (Text-fig. 8). It is elongate (width equals  $2/3$  of distance between condyle and tip of premaxilla); the orbit is large (maximum diameter larger than that of tympanum). The zygomatic arch is



TEXT-FIG. 6. *Graptemys oculifera*. The carapace and head of a mature male (Tulane 12054).



formed primarily by the postorbital. The maxillary is thin, its height below the orbit less than the maximum width of the zygomatic arch. The frontals extend between the nasals to form a triangle. The upper edge of the squamosal is smooth and rounded and there is no laterally projecting ridge on the occipital process. The parietals and postorbitals are rounded and do not have the rear edge projecting as a thin shelf over the temporal opening. The maxillaries are widely separated at the midline by the vomer and the premaxilla. No secondary palate is formed.



TEXT-FIG. 7. *Graptemys oculifera*. The head of a mature female (Tulane 12052).

The skull is unlike that of large females of other known species of *Graptemys* in its generally lighter structure, the absence of strong ridges, projecting shelves and broadened alveolar surfaces (Text-fig. 8).

**Range.** — These turtles are known only from the Pearl River and one of its tributaries, the Bogue Chitto River. The localities of Kohn are not acceptable. Specimens in the collection of the National Museum (029539, New Orleans; 15509-15511, New Orleans) were probably obtained in the local markets.

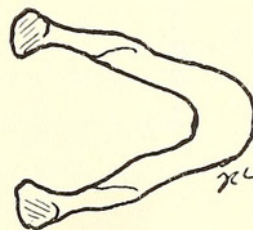
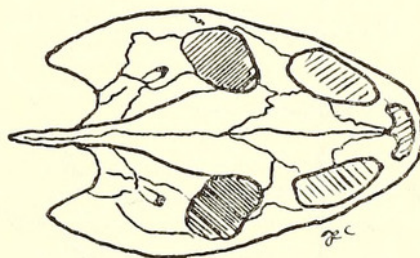
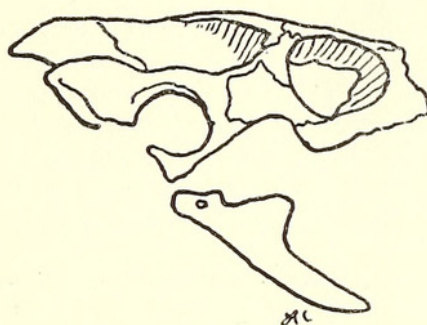
The absence of *G. oculifera* from any of the non-tributary streams east of the Pearl River (although *G. pulchra* and *G. barbouri* are often abundant) suggested a question as to the western limits of its range, which had been assumed to be the Mississippi River. Collecting in the Amite and the Tangipahoa River, both of which appear to provide satisfactory habitat, did not produce specimens. It thus appears that this form may be limited in its distribution to the Pearl River and its tributaries.

**Habitat.** — Wide sand beaches, a narrow channel and fast current are characteristic of those stretches of the river where the turtle is abundant. It was frequently seen basking on logs and debris over deep water into which it plunged at the slightest disturbance. On such basking sites it was commonly associated with *G. pulchra*, which occupies the same habitat.

These turtles have a remarkable ability to swim against the rapid current. Two were observed feeding on material growing on the un-

dersurface of a log projecting from the water. The objects (snails?) were almost beyond reach and the turtles had to assume a vertical position and paddle vigorously enough to lift the front end of the carapace from the water. By then extending the neck to its greatest length they could reach the log for a few seconds. When they ceased paddling, the current carried them rapidly downstream, but in a few minutes they would appear again, swimming easily against the current.

**Population.** — Hand collecting at night in the Pearl River has produced 51 *Graptemys oculifera*, 105 *Graptemys pulchra*, 20 *Pseudemys scripta troosti*, 12 *Pseudemys floridana mobilensis*, 7 *Sternotherus carinatus* and 3 *Amyda ferox spinifera*. No other species of *Graptemys* were collected in the Pearl River or its tributaries. It should not be assumed that this sample



TEXT-FIG. 8. *Graptemys oculifera*. The skull of an old female (Tulane 26; plastron length 20 cm). Only evident sutures are indicated.



adequately reflects the species ratio in the river, as night hand collecting is probably highly selective for *Graptemys*.

The *G. oculifera* sample includes 42 juveniles, 6 mature males and 3 mature females. Of the juveniles, 3 are 2-3 cm in plastron length; 28, 3-4 cm; 8, 4-5 cm; 3, 5-6 cm. All except 7, which were in their second growing season, were hatchlings in their first season. Those in the second growing season were 3.9-5.8 cm in length. The largest male was 7.4 cm in length, the largest female 13.2 cm.

The larger males and females had some of the indications of older age and had no evidence of recent growth. No larger individuals observed on basking sites or in the water were positively identified as of this species. These turtles become mature at a smaller size than any other species of *Graptemys* — except possibly an undescribed population in western Louisiana.

**Growth.** — The growth rates and ages of these turtles may be determined by analysis of the rings on the plastral plates. Procedures previously described by Cagle (1946) were used.

The plastron lengths at hatching as calculated from measurements of birth plates on 18 turtles in their first season of growth were 2.23-3.21

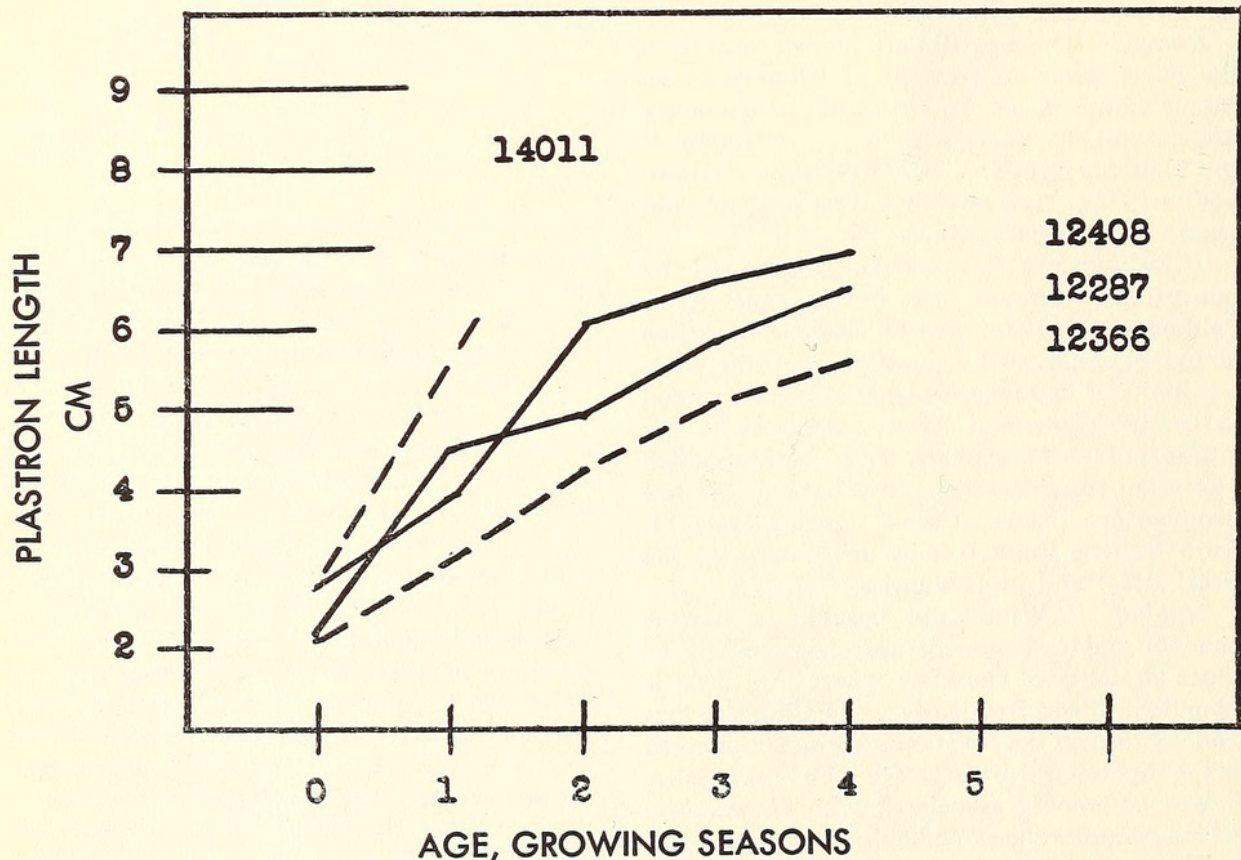
cm, with a mean of 2.71 cm. The plastron lengths of 4 hatchlings that had not grown were 2.23, 3.06, 3.22 and 3.27 cm.

Juveniles (19) collected during the early part of their first growing season (June 4-7) from Pearl River were 3.57 to 5.37 cm in length; juveniles (7) in their 2nd growing season were 3.90-5.80 cm in length.

The smallest sexually mature male (Tulane 12287) was 6.52 cm in length (Cl 7.18, Cw 6.5). Although motile sperm were present in the testes, the toe nails and pre-anal area were not conspicuously elongated. This animal was probably entering its first season of maturity. Growth rings evident on the abdominal plate indicate that the turtle was in its 5th season of growth. Two males (Tulane 12402; 12408), each 6.9 cm in length, were also in their 5th growing season. Growth calculations could not be made for 12402 but the rings are distinct on 12408 and growth could be calculated (Text-fig. 9).

The other males had no growth rings and no evidence of recent growth. The males evidently become sexually mature during the fifth growing season, after which growth slows or ceases.

The juvenile females may have a more rapid rate of growth than the males in the 2nd season of growth. One, 6.8 cm in plastron length, was



TEXT-FIG. 9. The growth of four individuals of *Graptemys oculifera*. Solid lines indicate the growth of juvenile males; dotted lines indicate the growth of juvenile females.



in the 2nd season of growth (Text-fig. 9: 14011) Another, 7.12 cm in plastron length, was in the 5th season of growth (Text-fig. 9: 12366). None of the adult females showed evidence of recent growth.

The smallest sexually mature female was 12.8 cm in plastron length (Cl 14.8; Cw 11.7); the largest female from the Pearl River was 13.2 cm in length.

**Breeding Habits.** — The repeated observation of many turtle trails crossing the wide sand beaches of the Pearl River in early June suggested that the Map Turtles might be depositing their eggs. A heavy morning rain on June 4, 1951, removed all trails from the sand. An examination of four beaches in late afternoon produced 12 trails of either *Graptemys* or *Pseudemys* leading across the beach into the shore grass. Many short "basking trails" were also evident. A female of *G. oculifera*, first seen at a distance, was watched for 35 minutes in the hope that she would excavate a nest. During the time of observation the only activity of the turtle was the occasional lifting of her head. Finally tiring and obviously alert to danger she moved toward a dense clump of grass where she was captured.

The pattern of movement could be readily traced in the sand. The female had emerged from the water, attempted unsuccessfully to climb a 45° sandy slope, turned back toward the water and then again attempted to climb upward. Reaching the top of the slope, she moved 100 feet across the sand to a tree, circled it and then moved diagonally to the place of nest construction. About six feet from the nest side she had dug a "trial nest," a hole 5 cm in diameter. Two roots, ¼ inch in diameter, crossing the cavity, possibly discouraged her digging.

The nest was not complete. A hole 3 cm in diameter and 3 cm deep led to a cavity 9 cm in depth. The temperature of the sand was 28.8° C. in the nest and 29.2° C. at the surface.

The female was the smallest mature one collected (Pl 12.8 cm; Cl 14.8 cm). Three eggs were present in the left oviduct. Two of these measured respectively: lengths 4.03, 4.00, diameters 2.06, 2.10 cm. The right oviduct was empty. The left ovary had three ovulation points (corpus luteum, corpus albicans) and two oocytes 1.6 and 2.1 cm in diameter. The right ovary had no ovulation points and two oocytes 1.6 and 2.3 cm in diameter. This female was depositing her first clutch of eggs this season and would probably have deposited a second clutch of four.

A female collected in April, 1950 (Pl 13.0 cm; Cl 14.0 cm) had not deposited eggs but

contained four oocytes 0.7 to 1.5 cm in diameter in each ovary.

**Food.** — A study of the food habits of the species of *Graptemys* is in progress and will be separately reported. The stomach contents of six juveniles, three mature males and one large female included only fragments of insects. The utilization of insects as food is correlated with the elaboration of the scissor-like jaw mechanism and the failure of the alveolar surfaces of the jaw to become broadened as in other *Graptemys*.

**Relations.** — *Graptemys oculifera* differs from any other known species of *Graptemys* in many respects of morphology and ecology. The juvenile color pattern and its retention in large adults, the broad carapace of the females, the elevated vertebral spines of the males, the extreme serration of the carapace edge in juveniles and males, the narrow head, the scissors-action of the jaws, the absence of the typical ridges, shelves and broadened alveolar surfaces in the skull, the small size of the mature males and females, the restricted range — all these and other characters make *G. oculifera* distinctive.

In its skull features this form approaches most closely juvenile *Graptemys pseudogeographica kohni*. Perhaps it is significant that it replaces *G. p. kohni* in its range. Certainly it cannot be closely associated in its morphology with *G. pulchra* with which it occurs in the Pearl River (Cagle, 1952).

Analysis of the origin and evolution of *G. oculifera* must wait detailed study of its osteology, ecology and distribution.

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