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The problem of the Atlantic Ridley Turtle (Lepidochelys kempi) in 1958*

by

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The general nature of the enigma posed by the Atlantic ridley (*Lepidochelys kempi*) has been outlined by CARR (2, 3, 4, 5, 6), and by CARR and CALDWELL (7). Although gaps in our understanding of the zoogeography and reproductive life of the ridley remain, slow progress toward a solution is being made. Recent observations along the Mexican shore of the Gulf of Mexico, showing that ridleys nest at least occasionally in Veracruz, together with other bits of relevant information, are discussed below.

Except for GARMAN'S (11) type specimen, only two mature ridleys have hitherto been known to zoologists. One of these was raised in captivity in the tanks of Marine Studios, Marineland, Florida, where it attained a weight of about 100 pounds, mated with a captive loggerhead, *Caretta caretta caretta*, and later laid eggs which were dropped in the water and thus could not be tested for viability (see CARR (6)). The other was a 93-pound individual with nearly mature eggs in the oviduct, taken by fishermen at Crystal River on the Gulf coast of Florida (CARR and CALDWELL (7)).

Recently, photographs of other ridleys of a size above the maximum for the populations known along the Gulf and Atlantic coasts of the United States have come to our attention. Strong sexual divergence is evident in these pictures, and since the sexual differences have not been illustrated elsewhere,

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we show the photographs as figures 1-3. The individual in figure 1 is clearly a female, as indicated by the short tail. It was taken in a small shrimp trawl, by the United States Fish and Wildlife Service's original M/V PELICAN, at Station 97-2 in 14 fathoms on January 14, 1939. The position of Station 97-2 was latitude 28° 36' N., longitude 90° 11' W., about 65 miles south of Morgan City, Louisiana, in the northern Gulf of Mexico. Although not measured, the turtle appears to have had a carapace length of about 29 inches. According to the conversion formula given by CARR and CALDWELL (7), this length would put it in the 90- to 100-pound class, making it one of the two of three largest ridleys known. The turtles in figures 2 and 3 were captured somewhere in Florida when small and were taken to the old New York Aquarium. When the aquarium was later torn down they were sent to the Government Aquarium at Flatts, Bermuda. The photographs were sent to us by Mr. Louis S. Mowbray, Curator at Bermuda, when the turtles were transferred from Bermuda to the new aquarium in New York, where they are still living. Measurements are lacking for these specimens also, but the pair is of interest because of the marked disparity in tail length shown. This not only indicates that they are probably mature individuals, but is another morsel of proof of reproductive orthodoxy in the Atlantic ridley. That is to say, they make it seem more likely that the ridley has two sexes (see CARR, 2, 4, 5; CARR and CALDWELL, 7).

Although we have never before seen an Atlantic ridley determinable as a sexually mature male, the older fishermen on the West Coast of Florida say that big, long-tailed individuals were often taken in former days, when the turtle fishery at Crystal River and Cedar Key was carried on much farther off shore than at present. Several of these old-timers have told us that ridleys in the offshore fishery ran larger than those taken in the shallow water about the river mouths where most of the turtling is now done. The fact that the big ridley in figure 1 was also caught offshore, some 35 miles from land, suggests either a more offshore habitat for the adult ridley than has hitherto been supposed or a life cycle that involves deep-water migration. Contributing evidence (CARR, 6) makes the latter conclusion seem the more likely.

While these bits of information were accumulating, some very small juveniles of the species were found in the southwestern Gulf of Mexico near Nautla and Alvarado, Mexico, under circumstances suggesting that they had hatched locally (FUGLER and WEBB, 10). In an effort to substantiate the occurrence of, and determine the extent of nesting in the area, Carr spent five weeks of the winter of 1957 on the coast of Veracruz, visiting points from Tampico southward to Coatzacoalcos, in the extreme southern end of the Gulf (figure 4). Though this period did not correspond with the nesting season, said by local people to be May and June, conversations with large numbers of fishermen and examination of turtle shells and skulls remaining from the preceding season yielded data, which though meager, seem trustworthy.

In a short extent of the Veracruz coast, from Tuxpan to a few miles south of Alvarado, people consistently claimed that a fifth kind of sea turtle occurred (besides the Atlantic green turtle, *Chelonia mydas mydas* (Linnaeus);

the Atlantic hawksbill, *Eretmochelys imbricata imbricata* (Linnaeus); the Atlantic loggerhead, *Caretta caretta caretta* (Linnaeus); and the Atlantic leatherback, *Dermochelys coriacea coriacea* (Linnaeus)). Here everybody who seemed to know anything about turtles recognized the fifth kind, called it either *lora* or *cotorra* (both of which mean parrot, and are presumably prompted by the psittacine beak of the ridley) and described it in terms unmistakably indicative of *Lepidochelys*. During this investigation some 100 fishermen were interviewed in 23 localities in Veracruz, and agreement that the *lora* or *cotorra* exists and nests there was practically unanimous. That it was actually the ridley referred to received more material proof when Carr came suddenly upon a seaside *cantina* a few miles north of Alvarado with three ridley shells nailed to its wall (figure 5). The shells had been painted red, and were visible from far down the highway, as if marking for the traveller the long-sought nesting ground of the ridley. A group of fishermen there stated positively that the shells belonged to the kind of turtle they called *lora*, and that the *lora* came regularly ashore to lay.

At every locality surveyed, the people said that although the ridley nests there it never comes out in numbers but is seen only once or twice during a season. Nowhere did there seem to be any knowledge of rookeries, such as the assemblages of loggerheads on the lower East Coast of Florida or at Jekyll Island, Georgia, or like the green turtle rookery at Tortuguero, Costa Rica.

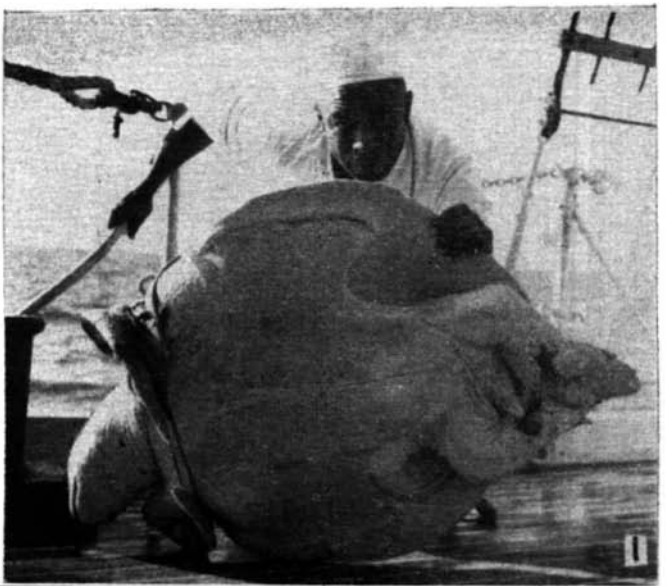
To investigate this point more fully, Carr returned to Veracruz in May, 1958, timing his visit to coincide with the alleged height of the nesting season of the *cotorra*. Between May 30 and June 8 the following localities were visited: Tampico, Tuxpan, Veracruz, Boca del Rio and beaches to the south of that town, Anton Lizardo, Isla de Sacrificios, and Alvarado. Although no valid measurements for quantitative appraisal of the situation could be devised, the beaches were searched carefully for tracks, fish markets were visited, and a standardized pattern of questioning of local fishermen was carried out. It was concluded that while ridleys certainly nest in Veracruz, no rookery occurs in the extent of territory between Alvarado and Nautla. Nesting by all species of sea turtles there appears relatively meager. At Tampico, people questioned had been frightened by a recent eruption of law enforcement by the local fisheries office, and the resulting skittishness before questioning made it impossible to learn anything of value. The coast north of Tampico, especially, requires further attention.

At Coatzacoalcos in the extreme southern end of the Gulf, magnificent sand beaches extend eastward and westward of the mouth of the Coatzacoalcos River. On sample two-mile stretches searched for tracks and for old nesting sign, there was no evidence of any nesting activity whatsoever. Interviews with people along this shore, and back in town at the fish wharves, revealed the curious anomaly of good-looking sea beach on which sea turtles of all sorts are completely unknown. In the few cases in which a person talked to claimed to have found a turtle on the shore this turned out to have been a freshwater species, evidently carried out to sea by the current of the nearby river and thrown

Fig. 1: Large live female *Lepidochelys kempi* from off Morgan City, Louisiana. (Photograph through the courtesy of William W. Anderson).

Fig. 2: Live female *Lepidochelys kempi* raised in captivity from specimen taken while young. Note short tail. (Photograph through the courtesy of Louis S. Mowbray).

Fig. 3: Live male *Lepidochelys kempi* raised in captivity from specimen taken while young. Note long tail. (Photograph through the courtesy of Louis S. Mowbray).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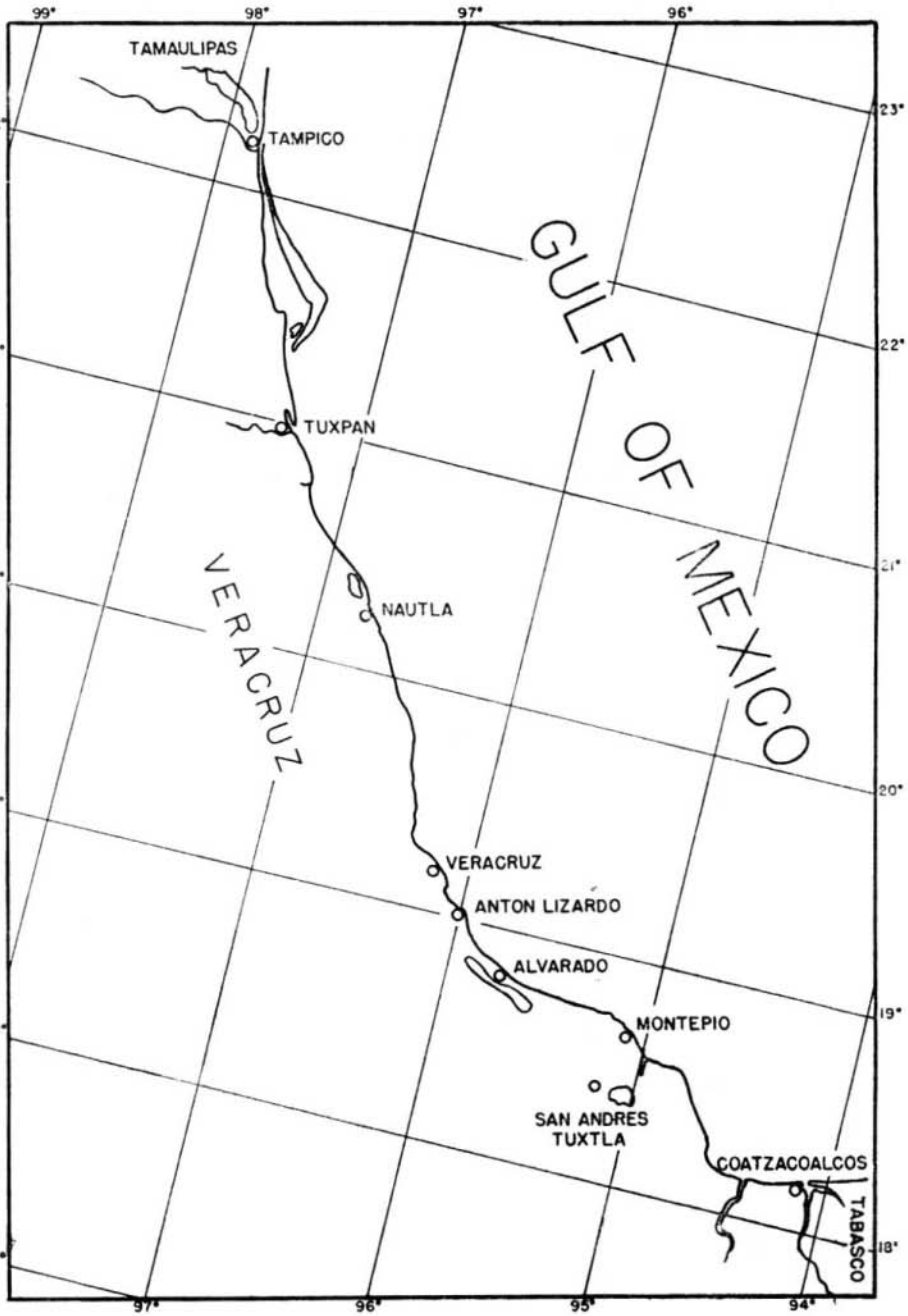


Fig. 4: Map showing the localities in the state of Veracruz, Mexico, referred to in the text.

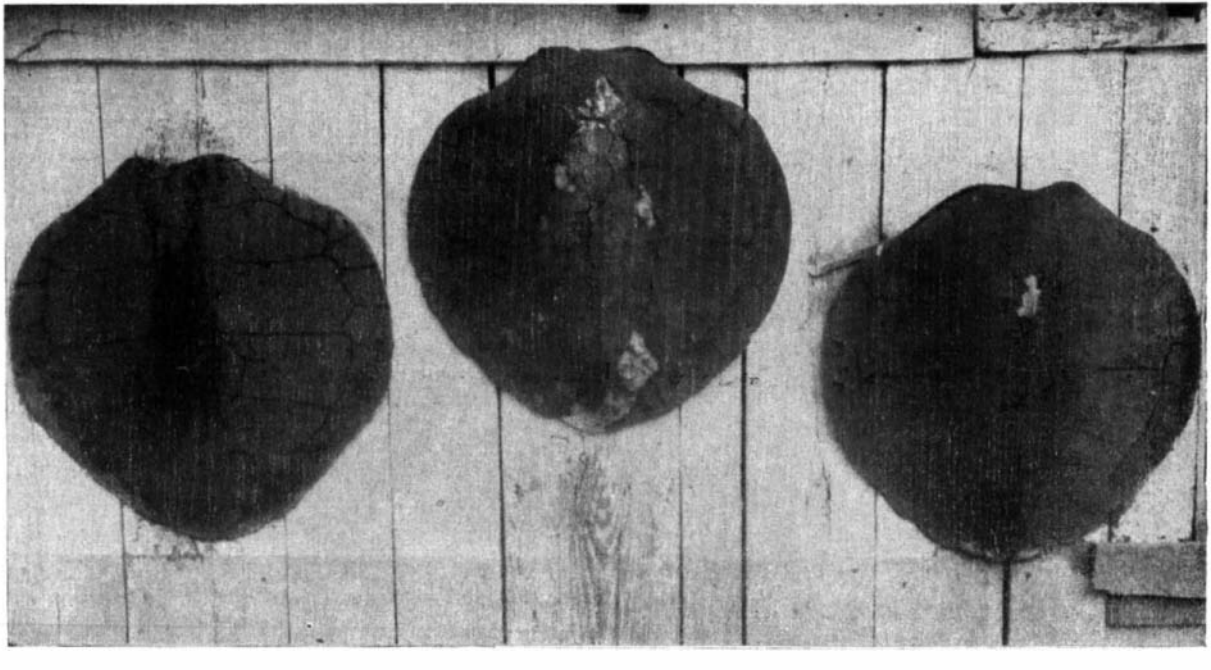


Fig. 5: Shells of three *Lepidochelys kempi* on wall of *cantina* near Alvarado, Veracruz, Mexico. The turtles allegedly had been taken when nesting and the shells had been painted and hung on the shop through some whimsey of the owner. This was within 25 miles of a locality where two other nesting females were later found (see text).

onto the beach by the surf. Here at Coatzacoalcos it was generally agreed that sea turtles nest in abundance at the foot of a mountain to the northward, at a place called Montepio, abreast of the Tuxtlas. Later inquiries at Veracruz, Alvarado, and San Andres Tuxtla produced the same information. Since it was not possible to approach Montepio by road during the rainy season, and since time was not available for a trip in on mule-back, substantiation of the somewhat widespread allegations was not secured.

DERANIYAGALA (8) made the surprising statement that the ridley is now known to nest on beaches around Miami, Florida, but adduced no information to support the remark, which was published at the time the discovery of young in Veracruz was announced. If a South Florida nesting ground was deduced on the basis of the finding of baby turtles in southern Mexico we find the idea unconvincing, since the present knowledge of current systems in the Gulf of Mexico (SVERDRUP, JOHNSON, and FLEMING, 15; LEIPPER, 12) stands in the way of an assumption that little, weak, and probably only days-old turtles could have swum or drifted from Florida to the places where they were found.

Judging from the pattern emerging from current studies of reproduction in other sea turtles, it seems likely that, somewhere, mass nesting by ridleys occurs. The coast of Quintana Roo was named by CARR (6) as an alleged breeding ground of the *"cotorra,"* now believed to be almost without doubt the ridley; but although heavy nesting does occur there it is mostly by other species and occurrence of the ridley is said to be limited to the sporadic emergence of an individual in the rookeries of the others, as loggerheads come out on the Tortuguero green turtle beach. Despite the apparent absence of *L. kempi* in the Caribbean, there is some unexplored territory there, and it still seems possible that a part of the American Atlantic ridley population could be derived from West Africa—either from somewhere within the range of the form that lives about and below the bulge, and in the Gulf of Guinea and which has predominantly six lateral laminae, or from the long extent of shore from Port Etienne to Morocco, where nothing is known of the turtle fauna (see CARR, 6). There remains also a need for a careful search of the South American coast from Belem northward to the mouth of the Orinoco River, especially in Dutch Guiana.

The South American coast south of Belem appears to offer no solution and indeed only adds anomaly to the situation, since it seems to represent a complete interruption of the range of the genus. CARR (6) commented on his failure to find ridleys anywhere between Belem and Recife. LUEDERWALDT (13) did not include the ridley among the sea turtles known from Brazil, and it was lacking in FREIBERG's (9) list for Argentina. During August, 1958, Carr found the ridley to be also completely unknown to fishermen and fisheries officers in southern Brazil and in Argentina. This surprising development was corroborated by results of examination of the sea turtle collections in the Museu Nacional at Rio de Janeiro, at the Museo Nacional in Buenos Aires, and the La Plata Museum at La Plata (Argentina). In these institutions a total of 42 specimens, representing all four other genera of sea turtles, was examined.

There was no specimen of *Lepidochelys* among them. It seems, thus, that southern South America not only offers little promise as a place of origin of five-scaled ridleys, but constitutes another of the curious gaps, like the Caribbean Sea and the western shore of the Indian Ocean, in the world distribution of this odd genus of reptiles.

While various kinds of circumstantial evidence support the inference from Fugler's and Webb's finding of recently-emerged young, that *Lepidochelys* nests in Veracruz, the only proof based on direct observation was the finding by Carr of two female ridleys that had nested on the beach at Anton Lizardo on June 8, 1958. The two turtles had emerged within a quarter of a mile of each other and had been found and butchered by Mexicans, who in spite of protective laws patrol the beach religiously, and probably rarely miss a turtle that comes out. The eggs had been taken away, and no amount of cajoling would persuade anyone to produce them, since at this place, too, temporary uneasiness over threats of law enforcement was in the air.

The shells of these two individuals were low and smoothly domed, with no mid-dorsal depression such as is often seen in breeding female *L. olivacea* (Eschscholtz). The greatest straight-line lengths of the two carapaces were, respectively, 652 mm. (about 25 3/4 inches) and 640 mm. (about 25 1/4 inches) and as is frequently the case in juvenile specimens (CARR and CALDWELL, 7), the shells were nearly circular as seen from above, the former being two mm. longer than wide and the latter eight mm. longer than wide. Both had five laterals on either side, and four enlarged inframarginals (some of which on each side were provided with a pore).

While these findings are of interest as substantiation of Fugler's and Webb's evidence that the Gulf coast of Mexico is a region where the ridley nests, they do not seem to justify an assumption that Veracruz, or at least that the parts of it visited by Carr, can be the sole site of origin of the abundant five-scaled ridleys of the western Atlantic. Since all evidence at hand indicates that the populations of immature ridleys in Florida and along the Atlantic coasts of the United States are large ones (CARR and CALDWELL, 7), the Mexican beaches so far visited seem insufficiently productive to account for the yearly recruitment in Florida waters.

However, Dr. Henry Hildebrand writes us that while carrying out ichthyological field studies at Laguna Madre in Tamaulipas he heard stories of an Arab trader who several times each season takes forty or fifty burros to the vicinity of Punta Juárez, about 40 miles north of Tampico, and brings them back loaded with turtle eggs. Dr. Hildebrand could not find out what species of turtle was supposedly involved. He thought that the stories were greatly exaggerated but perhaps had some rudiments of authenticity. Even a tenth the alleged number of burros could carry a lot of turtle eggs. If there is any such nesting ground there, and if ridleys use it heavily, it and the rookery rumored to exist at Montepio might conceivably account for the Gulf populations of ridleys and make it unnecessary to postulate their derivation from more distant sources (cf. CARR, 6).

The four small specimens reported by FUGLER and WEBB (10) from Nautla and Alvarado were not figured or adequately described. FUGLER and WEBB (10) gave brief counts and measurements and DERANIYAGALA (8) provided some color notes. Through the kindness of Mr. John M. Legler of the Museum of Natural History of the University of Kansas the four specimens have been made available to us for study and we offer the following additional information on them. Terminology used for the parts of the epidermal shell is that of CARR (2).

The four specimens agree in the following characters: one precentral; one pair of postcentrals; one pair of pregulars; one pair of humerals; one pair of pectorals; one pair of abdominals; one pair of femorals; one pair of anals; four pairs of inframarginals (some on each side with discernible pores); three pairs of postocular scales.

In that the specimens differ somewhat in other characters, each is hereafter considered separately. All linear measurements were made with vernier calipers to the nearest tenth of a millimeter. The lengths are measured in a straight line, *not* following the curve of the shell. Weights are to the nearest twentieth of a gram, taken with a double-beam balance with the turtles blotted dry. Color notes (taken in late 1957) are from wet specimens. When dry, the animals lighten to a uniform light grey.

UKMNH 39558 (figure 6, lower right, and figure 7) has the following data on the label: "Lepidochelys olivacea kempi juv. 549 R. G. Webb 4 Mi. N. Nautla, Veracruz, Mexico—Purchased From Boy Wo Collected Specimen Along Beach 25 July 1955."

The specimen has five pairs of laterals ("costals" of FUGLER and WEBB); thirteen marginals on the left side and twelve on the right; and five centrals. In the ventral aspect, the specimen has a normal gular on the viewer's left, but the one to the right has its lower left corner split off to make an accessory scale. There is another small accessory scale between the gulars. The left pregular is enlarged.

The color is a dark grey, except for some almost white markings around the anus. Other light places, not as light as those around the anus, are: the outer edges of the marginals; the trailing edges of all the flippers; the points of the four plastral ridges (especially the central two); the nasals (with the nostrils lighter still); the edges, particularly the posterior edges, of the plastral plates (contrast here not strong—only really obvious under low-power magnification); the posterior corner of the maxillary scale; and the midventral tip of the beak.

The edges of the marginals show slight growth, the dorsal plates none.

Measurements: greatest length of carapace, 43.5 mm.; greatest width of carapace, 35.0 mm.; greatest depth of body, 22.3 mm.; greatest width of head, 15.0 mm.; weight, 21.25 grams.

UKMNH 39557 (figure 6, upper left, and figure 8) has the following data on the label: "Lepidochelys olivacea kempi Juv. 548 R. G. Webb Purchased In Alvarado, Veracruz, Mexico 22 July 1955."

This specimen has five pairs of laterals, thirteen left marginals (as seen in dorsal aspect) and twelve on the right, five centrals, and one pair of gulars.

The coloration is the same as that of UKMNH 39558.

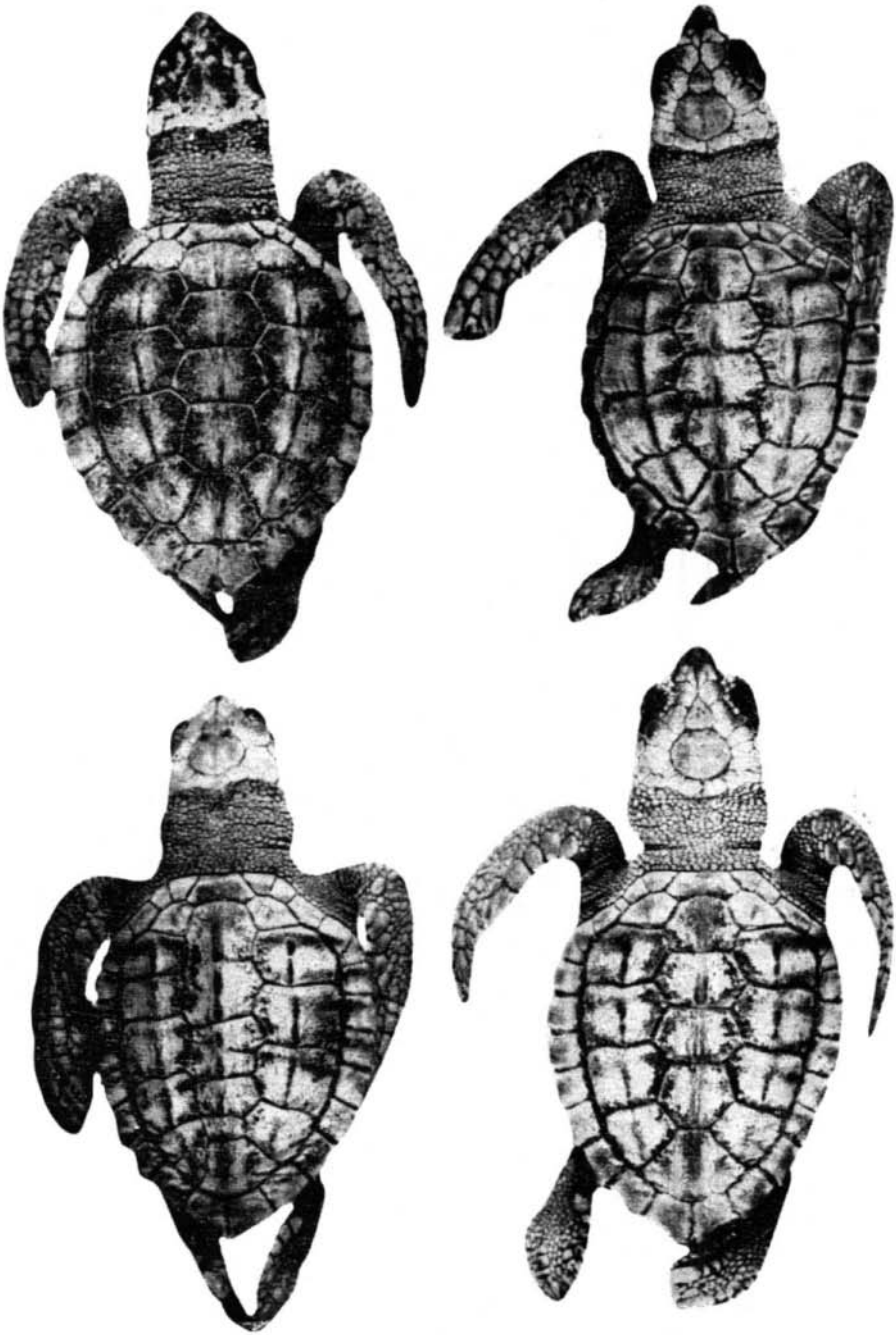
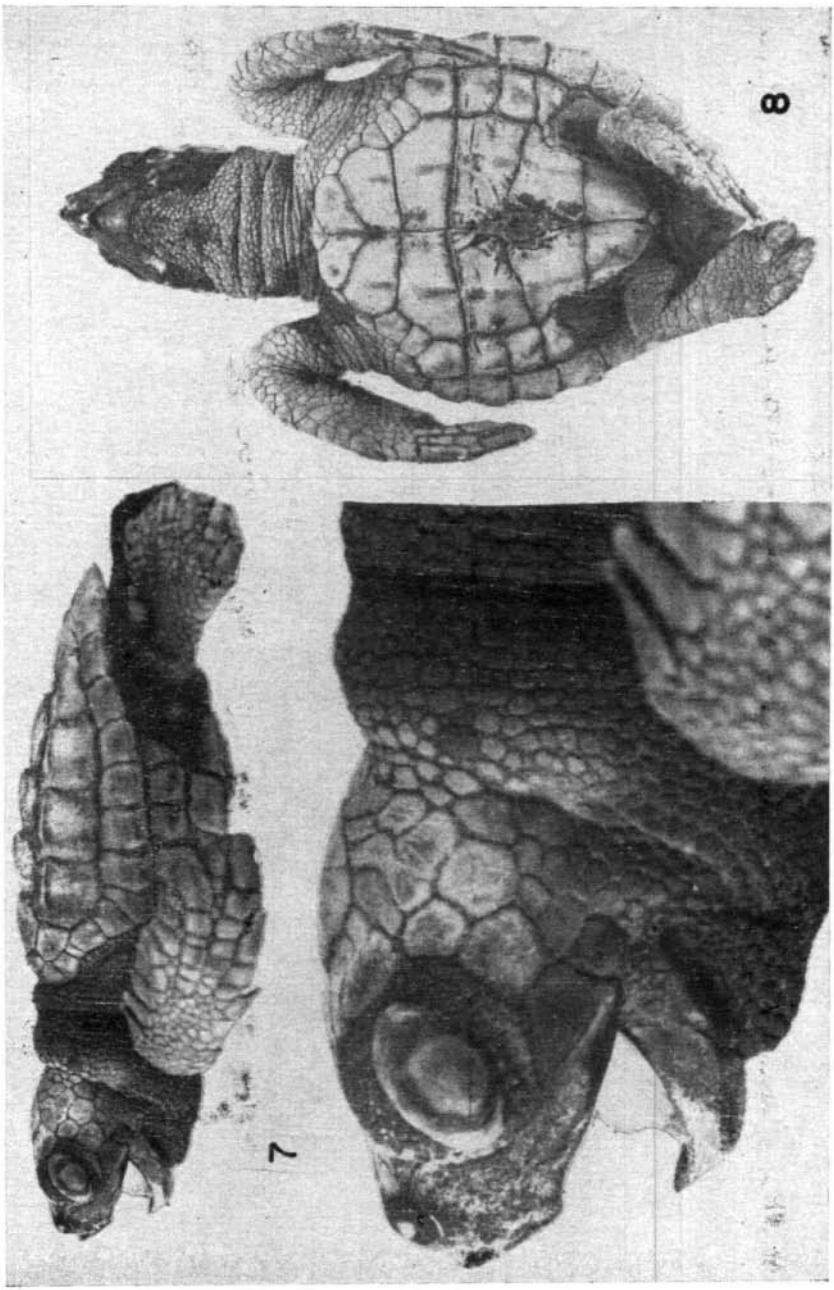


Fig. 6: Dorsal aspects of very young *Lepidochelys kempi* from the state of Veracruz, Mexico. See text for details. Upper left, UKMNH 39557; upper right, UKMNH 39555; lower left, UKMNH 39556; lower right, UKMNH 39558.

Left lateral profile of very young *Lepidochelys kempi*. UKMNH 39558. Note strongly ridged back in upper view, and egg tooth in the enlargement of the same turtle in the lower view.

Ventral aspect of very young *Lepidochelys kempi*, UKMNH 39557. Note umbilical scar.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The dorsal laminae show obvious signs of growth (about 0.5 mm.) along their edges, although the specimen retains, as do the other three, its hatchling egg tooth and umbilical scar.

Measurements: greatest length of carapace, 43.2 mm.; greatest width of carapace, 38.6 mm.; greatest depth of body, 18.7 mm.; greatest width of head, 14.9 mm.; weight, 15.00 grams.

UKMNH 39556 (figure 6, lower left) has the following data on the label: "Lepidochelys olivacea kempi juv. 547 R. G. Webb Purchased in Alvarado, Veracruz, Mexico 22 July 1955."

This specimen has five laterals on the right side, as viewed from above (FUGLER and WEBB (11) apparently have the numbers of laterals on each side reversed) and six on the left. The sixth is partially split so that it would be counted as seven if the break were complete (figure 9). There are twelve pairs of marginals and one pair of gulars. The ventrals are seemingly deformed (see figure 9).

The coloring is the same as that noted for UKMNH 39558 except that there is an additional light patch on the skin of the back leg which is touched by the posterior edge of the fourth inframarginal and the upper part of the femoral. The umbical scar also is light.

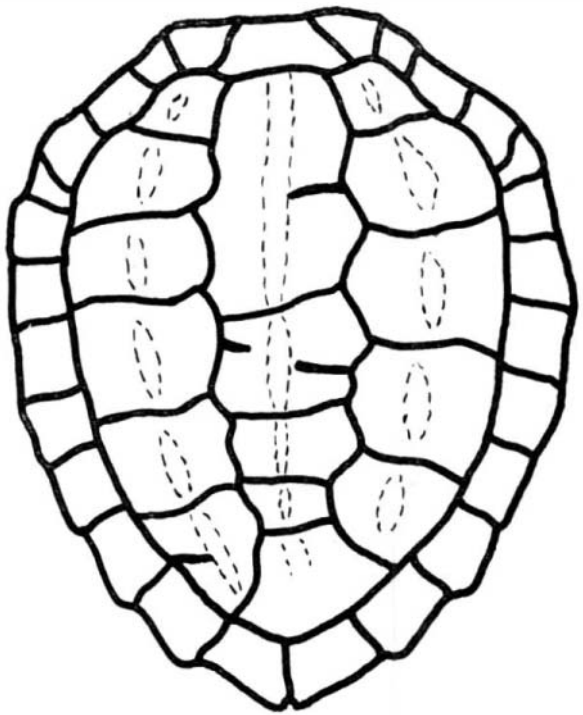

Fig. 9: Drawing (taken from photograph of specimen) of the dorsal aspect of a very young *Lepidochelys kempi*, UKMNH 39556. Note six left lateral laminae, with the sixth partially split, and the deformed and partially split centrals.

The dorsal plates show obvious (about 0.5 mm.) growth on their edges.

Measurements: greatest length of carapace, 41.2 mm.; greatest width of carapace, 33.4 mm.; greatest depth of body, 19.7 mm.; greatest width of head, 14.4 mm.; weight, 16.75 grams.

UKMNH 39555 (figure 6, upper right) has the following data on the label: "Lepidochelys olivacea kempi Juv. 546 R. G. Webb Purchased In Alvarado, Veracruz, Mexico 22 July 1955."

This specimen has five pairs of laterals; twelve left marginals, viewed from above, and thirteen right; five centrals; and one pair of gulars.

The coloration is like UKMNH 39556, except that the light patch on the legs is less intense.

There are slight traces of growth on the edges of the dorsal plates.

Measurements: greatest length of carapace, 41.8 mm.; greatest width of carapace, 35.2 mm.; greatest depth of body, 20.7 mm.; greatest width of head, 14.3 mm.; weight, 18.15 grams.

Thus, although much remains to be learned about ridleys, the gleanings of data presented here clarify some fundamental points in the life history that have until now been obscure. The 25- to 26-inch shells of the females found nesting at Anton Lizardo give the first indication of the lower limits of size of the breeding female, and show, moreover, that *L. kempi* is probably the smallest of all sea turtles. We now can also say that early summer is the nesting season, as it is with other species, and while the time cannot be more definitely delimited we at least can reject with more conviction the possibility of a mid-winter nesting season, as suggested by an early writer (GARMAN, 12). Definite breeding localities are now known, and whereas the shelled eggs and nests have not been described we know what the recently emerged young looks like.

On the other hand, nothing is known of mating behavior or of details of nesting cycles and processes. The zoogeography is inadequately understood, and, beyond tantalizing indications that mass travel of some sort is carried out (see CARR, 6), nothing is known of the seasonal and developmental migrations that one suspects will prove the most interesting aspect of the life history of the Atlantic ridley.

While our evidence is still too meager to warrant definite conclusions, the complete lack of records of *L. kempi* in the Caribbean and in the Bahamas makes it seem possible that the ridley may be endemic to the Gulf of Mexico and that records for the Atlantic coast of North America (CARR, 2, 5; BLEAKNEY, 1), Bermuda (MOWBRAY and CALDWELL, 14), and Europe (CARR, 2, 5), are based on stragglers lost to the Gulf Stream from the Gulf. If such is the case, a few undiscovered rookeries on still unexplored beaches of Mexico might—with our present ignorance of the quantitative aspects of the situation—be expected to produce the Atlantic ridleys of the world. Perhaps the reported concentration of nesting turtles at Montepio and Punta Juarez are two such centers of production.

ACKNOWLEDGMENTS

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RESUMEN

El autor aporta nuevos datos al problema de la tortuga marina *Lepidochelys kempi*. Se publican fotografías ilustrativas del marcado dimorfismo sexual de esta especie (figs. 1 a 3), y se cita información de haberse visto machos adultos en la costa occidental de Florida. La evidencia parece indicar que esta especie habita más afuera en el mar que las otras especies, o tal vez, más probablemente, que su ciclo de vida implica migración a mar abierto. Algunos ejemplares juveniles de *Lepidochelys* fueron capturados en el Golfo de México; el autor visitó en diciembre y enero de 1957 la costa sudoeste de Veracruz desde Tampico a Coatzacoalcos (fig. 4), para investigar la posibilidad de que esta tortuga ponga sus nidadas en dicha región. La época no correspondía con la de reproducción de las tortugas, pero sí se obtuvieron algunos datos interesantes. Los habitantes de la costa desde Tuxpan hasta el sur de Alvarado mencionan como una de las cinco clases de tortuga marina que conocen, a la *lora* o *cotorra* de la que la descripción parece coincidir con los caracteres de *Lepidochelys*.

Unos 100 pescadores de 23 localidades confirmaron que esta *lora* o *cotorra* existe y anida en la costa de Veracruz. Cerca de Alvarado se encontraron en la pared de una cantina tres conchas de *Lepidochelys* que los pescadores vecinos aseguraron eran de tortuga *lora*. No hubo ninguna indicación de que la tortuga *lora* llegue a la playa en bandadas, sino más bien de que sus números son siempre pequeños.

En mayo y junio de 1958 el autor hizo otra visita a la costa de Veracruz. De sus observaciones se corrobora que *Lepidochelys* anida en esa costa, pero no se pudo localizar ningún criadero de importancia como existe para las otras especies marinas. Cerca de Coatzacoalcos se vio una playa arenosa perfectamente adecuada para la cría de tortugas, en la que éstas son completamente desconocidas.

Se critica la opinión de DERANIYAGALA (8) de que ahora se sepa que la *Lepidochelys* anide en las cercanías de Miami, Florida.

El autor también probó en 1958 la ausencia de *Lepidochelys* de la costa brasileña, así como de Argentina, como también de las colecciones del Museo Nacional de Río de Janeiro y de los museos Nacional (de Buenos Aires) y de La Plata. La costa de Sud América constituye, pues, otro de los hiatos problemáticos de la distribución de *Lepidochelys*.

En junio de 1958 el autor identificó dos ejemplares hembra de *Lepidochelys* atrapados en la costa de Veracruz después de desovar.

Si bien queda comprobado que esta especie anida en la costa mexicana del Golfo de México, los números en que lo hace no son suficientes para explicar el número de ejemplares que se encuentran en la costa de Florida. Quedan algunas localidades mexicanas por investigar, que pueden dar resultados importantes.

El autor redescribe cuatro ejemplares de *Lepidochelys* de Nautla y Alvarado, mencionados por FUGLER y WEBB (10), (fig. 6).

Las observaciones de este año indican el tamaño mínimo de la hembra adulta de *Lepidochelys*, y también que *L. kempi* es probablemente la menor de las especies de tortugas marinas. Sabemos ahora también que anida en junio o julio, y conocemos algunas localidades en que anida.

Parece posible, pues, que *Lepidochelys kempi* sea endémica en el Golfo de México, donde tal vez las localidades como Monte Pío y Punta Juárez sean centros de producción.

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