Rev. Biol. Trop. 5(1):45-61, 1957

Notes on the zoogeography of the Atlantic sea turtles of the genus Lepidochelys*

by

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(Received for publication June 10, 1957)

In the zoogeography of the marine turtles the most salient single feature is the homogeneity of the representatives of each of the five genera, *Lepidochelys, Caretta, Chelonia, Eretmochelys* and *Dermochelys,* throughout the Atlantic and Indo-Pacific areas that they occupy. Like the others, the ridleys or bastard loggerheads *(Lepidochelys),* range through most of the warmer parts of the oceans, and the populations in waters on the two sides of the American continents are, taxonomically, surprisingly close. While there appear to be slight average differences among some of the Indo-Pacific stocks, and although there is a statistical divergence of West Atlantic and Indo-Pacific ridleys, it seems possible that when adequate information has accumulated the genus will prove to be one far-ranging, reproductively continuous species.

Meanwhile, however, the geographic and morphologic separation of *Lepidochelys kempi* in the Atlantic and *L. olivacea* in the Pacific is more trenchant than in the case of any of the other sea turtles and for this reason I prefer to retain binomials for them, in spite of good arguments for trinomial treatment.

The ridley of the western Atlantic, *L. kempi,* continues to hold a place as one of the more puzzling members of the North American vertebrate fauna. The species ranges (i.e., has been recorded from localities extending) from Texas around the Gulf of Mexico to a site of maximum abundance about the shallow-water flats of the West Coast of Florida. It is also common on the eastern coast of the northern half of the peninsula of Florida, but there is an odd fall in the frequency of records from Melbourne southward to Miami. From Florida northward it occurs as a visitant all along the coast to New England; and as an occasional straggler, evidently carried by the Gulf Stream, it is known from Nova Scotia, the British Isles and the Azores.

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* Field work supported by a grant (G 1684) from the National Science Foundation.

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predominant one (see Table 1) for West African *Lepidochelys*, while in Florida (the nearest locality for *kempi* populations) the 6 - 6 count would be decidedly aberrant. Of 100 Florida specimens of *Lepidochelys* examined, all had a 5 - 5 count except one in which the laterals were 5 - 6. The highway from Africa is obvious, while the trip to Gibara for a Florida specimen would involve cross-current and upstream wandering. All evidence thus indicates that the Antilles are still without a record of the American ridley, but that *olivacea* must be added to their fauna as an occasional straggler.

Why there is no record of, nor any acquaintance with, ridleys in the Bahamas is a puzzle. The short distance across the Gulf Stream from the Florida East Coast, where ridleys are abundant, would seem an unimportant obstacle to *kempi;* and if *olivacea* reaches Cuba through the Bahama archipelago it should also be known in the Bahamas. It seems likely that *olivacea* has not been recorded there simply because it is the southern Bahamas where it would most often come ashore. Little or no reconnaissance on the windward sides of those islands has been done by interested zoologists. In the northern Bahamas *L. kempi* may fail to show up because the 3-4 mile current separating its Florida territory (mostly the northern half of the coast) would sweep it north of the uppermost islands before it had wandered across.

But if this is the case, why has no ridley been found in Bermuda, which lies far enough to the north to permit cross-current wanderers from Florida to strand there? The answer here seems to be that the record has simply not been well kept. MOWBRAY and CALDWELL (15) tell of the taking of a young ridley in Bermuda, which constitutes the first record for *Lepidochelys* from the eastern edge of the Florida Current. The specimen has a 5-5 lateral count and it seems most logical to regard it as a current wanderer or migrant that strayed unusually far eastward as it moved downstream.

A distracting factor in the study of American sea turtles is the prevalence of belief, here and there, in the existence of kinds of turtles not yet recognized by zoology (GARMAN (11), LEWIS (12), AGUAYO (1). In most cases these are easily recognizeable as color phases or ontogenetic stages of known forms; and such now proves to be the case with respect to the McQueggie (McQuankie) of English-speaking Caribbean turtle fishermen, and to the *champán* of the Atlantic coasts of Cuba. On the northern side of Grand Cayman a group of acknowledged turtle experts agreed that a half-grown, very brightly marked loggerhead *(Caretta)* with unusually strong red tones in its ground color that I showed them was a McQueggie. A similar group in Cuba pointed to four young green turtles *(Chelonia)* as representative of the (to me) thitherto mythical *champán*. But in appraising such reports it ought to be remembered that the ridley itself was once thought to be a hybrid. Even after GARMAN (10) presented the ridley to science an aura of unauthenticity clung to it for years.

The most arresting of the remaining rumored species is the batalf of Trinidad (CARR *loc. cit*). While all my efforts to get a specimen of this alleged straggler to the northern coast of the island have failed, the evidence for its existence is persuasive and, especially since the turning up of the Cuban *olivacea,*

The bizarre aspects of the life history of the ridley, discussed in some detail elsewhere (CARR (3) (4) (5) (6), CARR and CALDWELL (7), are, briefly: (a) a completely cryptic reproductive history (no shelled eggs in females, no observed courting or mating, no nesting emergences) and (b) the apparent complete absence of the species from the Caribbean, where the other four kinds of sea turtles are all represented as breeding residents or migrants. There remains, thus, a stubbornly unassailable problem as to where ridleys come from.

Although the information that can at present be adduced is little and miscellaneous, it nevertheless appears sufficient to make advisable a taking of stock, and a revising of previous theories of ridley origin.

From the evidence available, in 1955 I proposed that the ridley breeding ground be looked for in some little-visited island or group of islands in Florida Bay off the southern tip of the peninsula. Further search and inquiry there, and aerial reconnaissance of island beaches of the area (David Caldwell for NSF project G1684) show the notion that the seasonally large ridley populations of other parts of Florida come from that region to be no longer tenable. Since no neighboring area can be named as a logical alternative it must be supposed that ridleys come from a distant nesting ground, and this requires a corollary assumption of migratory spreading from that nesting ground. While evidence to support such an assumption is fragmentary it seems to be growing, as the notes below will show.

RANGE EXTENSIONS FOR ATLANTIC *Lepidochelys*

AMERICA

Until recently the great gap in the recorded range of *Lepidochelys* in the Caribbean area has taken in all the West Indian-Antillean Islands with the possible exception of Trinidad (CARR (4) (6). In 1953 AGUAYO (1) recorded *Lepidochelys olivacea kempi* from Gibara on the northeastern coast of Cuba, on the basis of a specimen taken by hawksbill fishermen there and sent to Havana by señor Joaquín de la Vara of Gibara. I later visited Gibara and found that neither the fishermen nor señor de la Vara had ever seen such a turtle before. AGUAYO identified the specimen as *kempi*, in spite of its having 6 lateral laminae on either side, on the grounds of proximity to *kempi* range in Florida (the southernmost previous authentic record is for Dry Tortugas). After examining the specimen and the place where it was taken, and after conversing with people around Gibara, I feel convinced that this was a stray "*olivacea*" (i.e. *olivacea* in the West African sense) brought in with the westward current from the African Coast. While there is considerable shielding of northeastern Cuba by the Bahamas, drift bottle data show that the North Equatorial Current can readily carry flotsam to Cuba; and once inside the Bahama screen, strandings in the Gibara area should be frequent. The scale count of the Cuban specimen is the greatly

predominant one (see Table 1) for West African *Lepidochelys*, while in Florida (the nearest locality for *kempi* populations) the 6 - 6 count would be decidedly aberrant. Of 100 Florida specimens of *Lepidochelys* examined, all had a 5 - 5 count except one in which the laterals were 5 - 6. The highway from Africa is obvious, while the trip to Gibara for a Florida specimen would involve cross-current and upstream wandering. All evidence thus indicates that the Antilles are still without a record of the American ridley, but that *olivacea* must be added to their fauna as an occasional straggler.

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I am inclined to regard the folk talk of the batalí as based on fact.

EUROPE

As was indicated above, the end point in 5-scale ridley distribution in the Atlantic has hitherto been represented by a single specimen known from the Azores (DERANIYAGALA (8). In 1930 DESPOTT (9) published a paper recording two specimens of *"Chelone mydas"* from Malta. He figured both specimens. One is a Chelonia, as he said, but the other is clearly a young *Lepidochelys*, and the first record for the Mediterranean. I believe I count only 5 laterals on the one side in view in the halftone, but cannot be sure. A letter from the director of the museum in Valletta reveals that the specimen was destroyed during the last war. On logical grounds, from what little is known of ridley zoogeography, it seems probable that this was a *kempi*. In any case it represents a considerable extension of the range of the genus.

The Azores have been suggested by several zoologists as a possible ridley breeding ground, chiefly on the basis of the position of the islands in the global current system and of the small size (100 mm.) of the one specimen known from there. On a trip to the Azores in the summer of 1956 I found nothing to support this idea. There were no signs of nesting emergences on the few suitable beaches there, and though the population of the islands is intimately associated with the sea, there was no real knowledge of sea turtles to be found. The many whalers and fishermen interviewed agreed that a few turtles were caught each year, usually incidentally netted during fishing operations; but from their descriptions it was not possible to decide whether the turtles involved were ridleys, or loggerheads, or perhaps both. Additional talk with fishermen, and examination of turtles in collections and aquariums in Spain and Portugal revealed neither specimens nor any knowledge of ridleys. The Portuguese coast seemed to me an especially likely place to look for current-borne American *kempi;* but of 12 young Portuguese sea turtles in the Aquario Vasco da Gama all were loggerheads. It is of interest however that they were homogeneously *C. c. caretta*, the West Atlantic form, and not the race with 13 marginals, of the African Coast.

Needless to say, there is no significant nesting by sea turtles on either the Spanish Costa Brava or the Portuguese shores, and in the search for the origin of the West Atlantic ridley Europe and the Azores need no longer be taken into account.

AFRICA

In West Africa the genus *Lepidochelys* has hitherto been known from localities extending northward to Dakar on the extreme of the Bulge, with Congo, Cameroons and Senegal being known nesting centers. On a recent trip to West Africa I examined a specimen (in the collection of the Institut Français d'Afrique Noire) from Port Etienne, Mauretania, near the Spanish Sahara frontier and some 500 miles northward of any previous locality. I have seen or have data for a

TABLE 1

West African localities for Lepidochelys

Collection or source of record	Locality	Lateral Laminae
IFAN (Cadenat, 1954)	Mauretania, Port Etienne	7-6
IFAN (Cadenat, 1954)	Sénégal, Hann	7-7
" "	" "	7-7
" "	" N'Gaparo	7-7
" "	" "	7-6
" "	" Joal	7-6
" "	" Gorée Island	6-6
" "	" "	6-6
" "	" (no locality)	7-7
BM 1947 1.1.21-22	Liberia, N. of Pt. Marshall	7-7
" "	" "	6-5
BM 1940 2.23,3	Gold Coast, Tenia	6-6
IFAN	Ivory Coast, Tabou	7-7
PM	Ivory Coast	6-6
"	"	6-6
"	"	6-8
Berlin M. 15513		
(Loveridge and Williams, 1957)	British Cameroons, Victoria	5-5
"	"	5-5
"	"	6-5
"	"	6-6
"	"	6-6
PM 41.58	Gabon	7-6
"	"	7-6
"	"	6-6
MRCB 192	Congo, Banana	6-6
" (photo)	" "	?-6
BM 1901 3.12.44-45	" "	7-6
"	" "	6-6
MRCB 9357	Congo, Moanda	7-7
" 10.266	" "	7-6
" 10.267	" "	8-7

The list includes only specimens now in museum collections. The column at the right gives the number of lateral laminae on either side of the carapace. The localities are arranged according to their north-south distribution. Abreviations used are as follows: IFAN = Institut Français d'Afrique Noire (Dakar); BM = British Museum (Natural History); PM = Paris Museum; MRCB = Musée Royal du Congo Belge; Berlin M = Berlin Museum.

total of 31 West African specimens for which lateral counts were available. These are listed in Table 1. As will be noted in the table, with respect to the single character used in separating Atlantic and Pacific *Lepidochelys*—the number of lateral laminæ—the West African specimens (which must be called *olivacea* because they have the count characteristic of the Pacific population [see fig. 1]) show much greater variability than can be found in Florida *kempi*.

It may be somehow significant that the only occurrence of the low laminal count is in hatchlings. In a series of five siblings from Cameroons two have a 5-5, one a 5-6 and two a 6-6 count. Of two sibling hatchlings from Liberia, one shows a 5-6 count and the other a 7-7. If these low counts had occurred somewhere toward the northern end of the African range it would have suggested that contact with *kempi* was occurring—either through admixture of blood of occasional accidental Gulf Stream waifs, or because of the existence of an unknown 5-scaled colony on the Sahara Coast to the northward.

Refering to the Cameroons series, LOVERIDGE and WILLIAMS (13) said: "these specimens must be regarded as intergrades between *L. o. olivacea* (Eschscholtz) and *L. o. kempi* (Garman)." Whether they meant *geographic* intergrades, or merely evidence of phenotypic overlapping, is not clear. I prefer to say that the specimens simply show that the one character thus far found to separate the *"olivacea"* style of *Lepidochelys* from the *kempi* style appears to show more variation in West Africa than anywhere else in the known range of the genus. Counting single scale-sides (instead of bilateral individuals) the known West African incidence of the 5-count is 10.7 per cent. But it ought to be pointed out that this incidence, taken from two sets of siblings, is a biased frequency. In spite of the probability of current-borne arrivals of American ridleys in Africa, I doubt that these variant hatchlings from below the Bulge, where north-trending currents prevail, and from inside the range of the high-count population, are evidence of contact with *kempi*.

In any event, the most striking zoogeographic aspect of the West African ridley population is not its variability, but the fact that it predominantly agrees with the Pacific stocks instead of with its West Atlantic congeners, and that West African *Caretta* does the same thing. It seems likely that these two are reflecting zoogeographic, or paleozoogeographic, influences of deep-seated significance, perhaps to be finally elucidated only through study of the distribution of fishes and other groups in which large series can be collected in all the critical localities.

THE QUESTION OF THE ORIGIN OF THE AMERICAN RIDLEY

The lack of any breeding activity in the Florida ridley has only recently been revealed, in my own thinking at any rate, as the natural result of a homogeneous immaturity of the Florida populations. The only individual recorded by CARR and CALDWELL (7) weighing over 60 pounds was a 93-pound female that caused a great stir among the fish houses at Cedar Keys (Florida) because it was the biggest anyone had seen. Significantly, this turtle had well developed

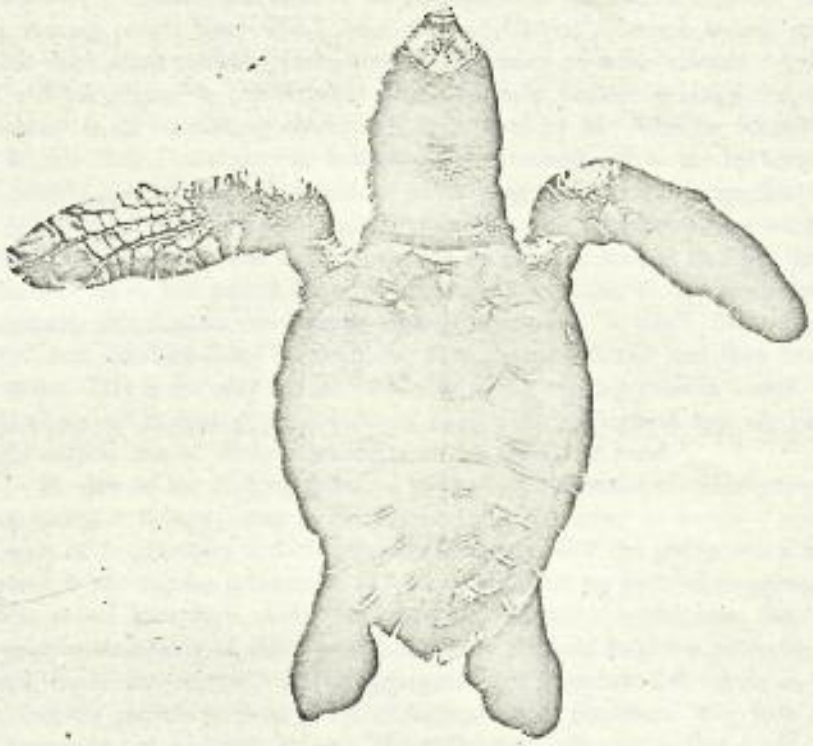

Fig. 1: *Lepidochelys olivacea* (hatchling) from Dakar with a 7-7 lateral laminal count. The character involved in the diagnostic separation of *kempi* and *olivacea* appears to be fundamentally a tendency in *olivacea* to revert to a (presumably primitive(many-scaled condition. In the present specimen laterals 4 and 5 seem to have been formed by the splitting of lateral 4 as seen in *kempi*, but the possibility that two scales, from two separate embryonic elements, have been squeezed into the place of one cannot be excluded.

eggs in the ov.ducts. Mr. F. G. Wood of Marine Studios told me *(in litt.)* of the mating of the big female ridley in the Marineland aquarium (an individual thought to weigh about 100 pounds, figured by CARR (5)) with a loggerhead male, and the subsequent laying of eggs. The eggs were laid in the water and were not viable, but the implication of normal breeding habits for the species, and of a 90-100 pound lower limit for sexual maturity, are important. All the facts now known imply that ridleys come to Florida from elsewhere, and negative evidence available seems to show that the place they come from is far away. Usually the finding of marine animals far from the place where they were born means that mass migration has occurred. It thus seems necessary to scratch about for any evidence that might bear upon such an occurrence in the ridley.

EVIDENCE FOR MIGRATION

In 1946 OLIVER (16) told of having passed through an extensive school of the East Pacific ridley, currently *L. olivacea*, off the coast of Guerrero (15° 57,N., 99° 46'W.). This was in water more than 2000 fathoms deep and there can be little doubt that the aggregation there indicated a long-range group movement of some kind. While the turtle involved was *olivacea* and not *kempi*, the differences between the two are so slight that it seems unlikely that any very fundamental divergence in their biology could occur.

To be added to the case for a migratory habit for the Pacific ridley are a number of reports of the sighting of schools of unidentified turtles offshore in this same general region. In a recent issue of the "Marine Observer" (14) the following note appeared:

> S. S. Pacific Fortune. Captain H. A. Shaw. Panama to Los Angeles.
> Observer, Mr. H. D. Campbell, 3rd Officer.
> 23rd February, 1956. Between 1700 and 1800 G. M. T. Passed between 40 and 50 turtles. The sea was rippled and there were large patches of what appeared to be plankton on the surface and also to a depth of 2 to 3 feet. The vessel was about 13 miles from the coast approaching Point San Telmo.
> Position of ship: At 18°00'N., 103°21'W.

On page 5 of the same issue there is another note on sea turtles:

> M. V. Cingalese Prince. Captain R. C. Proctor, O. B. E. Panama to Los Angeles.
> Observer, Mr. K. E. Maxwell, 4th Officer.
> 4th-5th February, 1956. Turtles were observed proceeding in a SE'ly direction, but it was noticed that although the weather conditions were similar to those experienced during the vessel's last voyage only about a quarter as many turtles were observed.
> Positions of ship: At 0000 G. M. T., 4th., 12° 24'N., 78° 18'W.; at 1800, 6th., 10° 18'N., 88° 00'W.

Accompanying these observations are notes by Dr. H. W. Parker, Keeper of Zoology of the British Museum. One of Dr. Parker's comments was that the month of the observations seemed to preclude the movement's being a breeding

migration. Since summarizing data on nesting dates for the ridley CARR (3) I have had several word-of-mouth reports of East Pacific ridleys nesting as late as December, and the season may well extend throughout the "winter" months along parts of the American coast, as it does in Asia. It would thus not be unthinkable that the February schools were turtles leaving a nesting area *en masse*. The primary assumption, however, would be that they were ridleys and not some other kind of turtle.

During the past year I have had an opportunity to discuss East Pacific turtles with a considerable number of fishermen on the Pacific coast of Costa Rica. Among people there who known offshore Central American waters, nearly all can offer some anecdote concerning the sighthing of turtle schools.

With respect to the Atlantic form, the only positive evidence for mass movement is an astonishing observation disinterred by Mr. William Schevill of the Woods Hole Oceanographic Institute, and communicated to me by letter. A few months ago Mr. Schevill examined some 20-year-old sea-turtle specimens in the collection of the Marine Biological Laboratory and found that they were all ridleys. In making inquiries about the origin of these he learned that Mr. James McInnis of MBL had picked them up, all at the same time, from among dozens of carcasses left stranded on Woods Hole beaches after "a whole fleet of such turtles" had travelled from Buzzards Bay into Vineyard Sound and then headed out to sea. This is the only authenticated case of a mass migration in *kempi*. The implications of its taking place outward from a New England bay are unsettlingly unclear, but of obvious relevance to the inquiry at hand.

In view of the striking character of the two authenticated observations of group travel in ridleys —one in the Pacific form, the other in *kempi*— and of the mass of fragmentary and circumstantial evidence that the phenomenon is of frequent if not regular occurrence, it is surprising that no more observations of schools at sea have been made. Not only Mr. Schevill's information, but also the relative abundance of ridley records for New England localities generally and indeed, the mere occurrence of the aggregations of immature individuals in Florida, indicate arrivals in those places of migrants from elsewhere. Why have they not been seen, or reported, at sea? The only other information that could possibly bear on the case is a report by a reliable member of the crew of the Fisheries Research Vessel (U.S. Fish and Wildlife Service) Oregon, who, on a voyage on a tug, sighted what he took for a school of about 200 seals some hundred miles off the mouth of the Mississippi River. Since the only seal in the Gulf of Mexico is generally regarded as nearly or quite extinct, and since swimming seals and swimming turtles look very much alike at a short distance, this observation could have involved a mistaken identification and the "seals" could have been ridleys. But here, again, we come up against the fact that we are almost as hungry for facts showing the green turtle to be a migrant, and even more sure that it is one.

I heard of the sighting of the "seals" in the Gulf in a letter from Mr. Stewart Springer of the U.S. Fish and Wildlife Service. Mr. Springer has also furnished what seems a useful pattern for theorizing, in a manuscript of his (lent

me in advance of publication) on the distribution of sand bar sharks. In this there are striking parallels with what is known of ridley distribution (coincident unexplained gaps, apparent occurrence of population recruitment by passive or erratic migrations, reproductive cycles geared to the global current system, an Africa-Trinidad tie of some sort) and it seems at present to be the general sort of situation that should be looked for as the explanation of the ridley puzzle.

As was mentioned earlier, the only place where 5-scaled ridleys are known to occur in anything other than the excessively dilute (usually monolateral) frequency in which they turn up throughout the Indo-Pacific range of the high-count stocks, is the coast of West Africa. Since the equatorial currents come to America from that area —the South Equatorial from below and the North Equatorial form above the Bulge— it might be suggested that ridleys of the Gulf of Mexico and western Atlantic coasts are brought in by these currents as they brought in the Cuban *olivacea* and perhaps bring the Trinidadian batalis.

But in the light of what is known of the incidence of the 5-scale condition in West Africa this explanation would involve the assuming of selective migration (or selective current-extraction) of the 5-scaled minority and the leaving behind of the high-count majority. It may be conceivable that the individuals with fewer laterals are more venturesome, or more readily carried off by currents, or that they react differently to internal or external stimuli that lead them to go to America. But I know of no parallel case anywhere and do not hesitate to apply Occam's Razor to the notion.

What seems far more likely is that there is an undiscovered colony of five-scaled ridleys somewhere, perhaps on the northern coast of West Africa. This will be recognized as an idea that we rejected earlier as an explanation of the distribution of the 5-scale count in West African ridleys. But it should be re-examined in the light of the facts that: (1) the coast in question is from the zoological standpoint very poorly known; (2) it is adjacent to a current highway, which drift bottle data have shown to allow strong communication with America (see fig. 2). On a recent trip to West Africa I tried to arrange a visit to Spanish Sahara and was unable to find any reasonably direct means of transportation. But a flight along the coast from Mauretania to Morocco showed the whole shore there to be practically uninhabited for hundreds of miles, and a place where ridleys might abound, with nobody the wiser.

While drift bottle data favor the Spanish Sahara coast as a possible source of ridleys picked up by the Canaries Current, they do not favor the South Equatorial Current as a transporting agent. Driftings to Florida from the Guinea Gulf seem much less likely to occur than those from above the Bulge. Moreover, the shores south of the Bulge and their turtle fauna are better known, and there is less possibility that colonies of predominantly 5-scaled ridleys are hidden there.

There is one important objection to the assumption that the ocean currents bring ridleys from Africa, or in fact from anywhere outside hte West Indian archipelago. The poulation of ridleys in the Gulf of Mexico appears to be a big one. The drift bottle plots offer plenty of evidence to explain how African flotsan. reaches the Gulf of Mexico. But there is a far greater incidence

of bottle strandings on the outer coasts of the islands than on the mainland beaches, as would be expected. Unless we assume an active avoidance of the islands by current-borne ridleys it is hard to explain their accumulating in abundance in the Gulf without leaving heavy trace of their passing in the islands. This objection is, however, not insurmountable, because the travel may be done by organized, compact schools that select certain restricted passages and routes in going through the island screen and in crossing or circumnavigating the Caribbean. There seems little likelihood that the ridley is a member of, or a regular transient in, the littoral fauana anywhere in those areas.

As fig. 3, shows, there is effective current communication from the northern coast of South America to the Gulf of Mexico. Field work along the shores of the Bulge of Brazil has convinced me that ridleys are not breeding residents there and that current immigrants must be very rare if they occur at all. But between Brazil and Venezuela the shore is unknown to me and the ridley rookeries might be somewhere along the Guiana coasts, although the objection opposing the idea of an African origin —the lack of records from the screening islands— would apply in this case too. On the other hand, the alternative to a distant derivation is a nearby one, an origin within the Gulf of Mexico itself, and since the ridley is not even known from the western Gulf, logic seems to point back to Africa, where at least there are ridleys, where the five-scaled condition is known to occur, and whence currents bring drift bottles to America. It is not a satisfying theory, but it is the best there is just now.[1]

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[1]) After page proof of the foregoing had gone back to the printer I saw FULGER's and WEBB's note (*Herpetologica*, vol. 13, N° 2, July 10, 1957, p. 107) recording *L. kempi* from Veracruz, Mexico, on the basis of four young specimens bought from residents there. These are certainly newly hatched individuals, since the average shell length (43 mm) is well within the range of hatching lengths of the Pacific ridley. They not only are the first known hatchlings of American *kempi* but afford the first firm grounds for recording *kempi* from the western Gulf of Mexico. While it is possible that they originated at a distance from the site of capture it seems most probable that their nests were in adjacent beaches of Vera Cruz, which thus supplants or supplements my postulated Spanish Sahara and South American areas as a likely source of the Florida ridley populations.

By coincidence I have also just received a letter from Ladislao Tejero, an exporter of turtles in Yucatán, saying that besides the loggerhead, green turtle, hawksbill and trunkback (which all nest regularly in Quintana Roo), there is another turtle there called locally *cotorra*, which is of rare occurrence, never nests, and is thought to be a hybrid between loggerhead and green turtle. This is almost surely the ridley. The fact that it is a rare, nonbreeding visitor just across the Gulf from where the hatchlings were found, as it is in Texas, which lies between Veracruz and the heavily populated ridley flats in Florida, would seem to limit possible sites of nesting to the westernmost parts of the Gulf. The fact that one of the hatchlings in the small sample has six laterals on one side is surprizing, in the light of the very low frequency of this trait in the Florida population, and as in the case of the West African material discussed above it is perhaps significant that the variation turned up in a hatchling and not in an adult.

Fig. 2: Drift bottle recoveries in American or local waters from releases in four 5-degree rectangles off the coast of West Africa. The numbers indicate days of drift. The plot shows *all* recoveries of bottles released in the areas involved. Data, furnished by Woods Hole Oceanographic Institution, are mostly from U. S. Hydrographic records extending from the 1890's to the present.

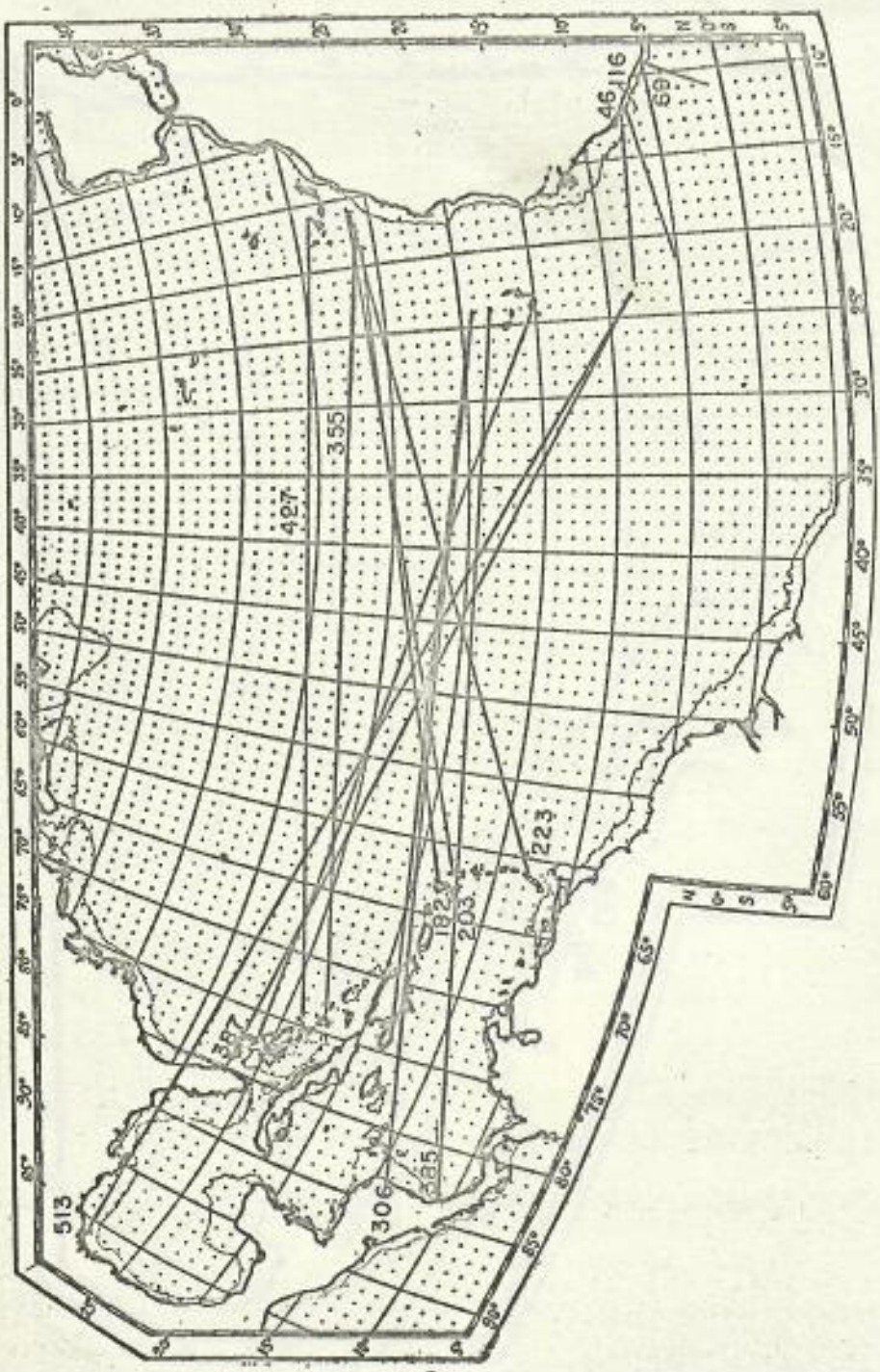
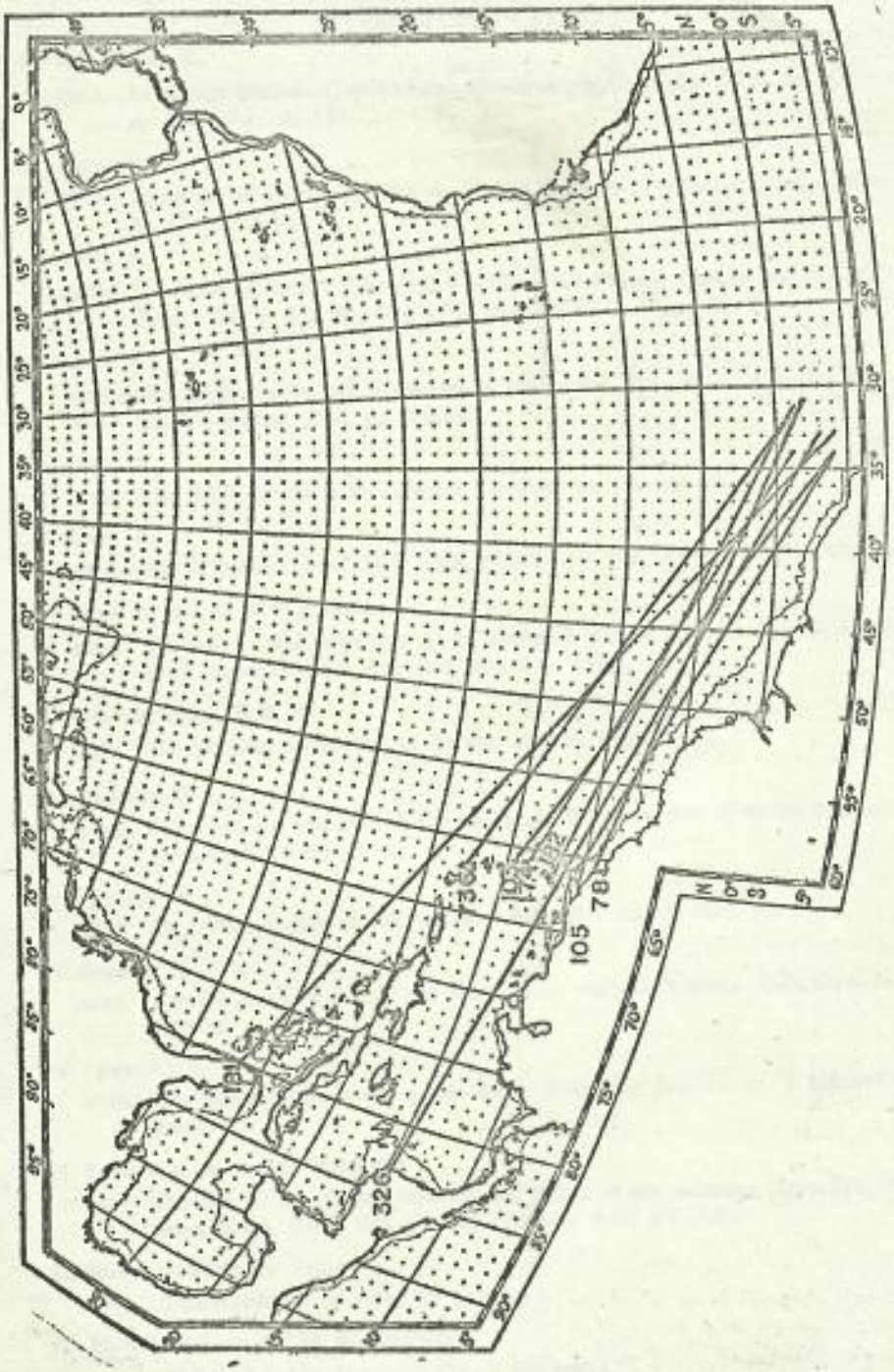

46
116
69
355
427
223
182
203
387
385
306
513

Fig. 3: Recoveries of drift bottles released in a 5-degree rectangle off the northern coast of South America. The numbers indicate days of drift. The plot shows *all* recoveries of bottles released in the area involved. Data, furnished by Woods Hole Oceanographic Institution, are mostly from U. S. Hydrographic Office records extending from the 1880's to the present.


105
78
32

ACKNOWLEDGEMENTS

For their kindness in furthering field work or in making available specimens or data I am grateful to the following: Theodore Monod and Jean Cadenat, IFAN (Dakar and Goree Island); David Caldwell, University of Florida; Alice Grandison, British Museum; J. Guibé, Paris Museum; Dimitri Kasakevitch, I. R. Caça e Pesca, Recife, Pernambuco; M. Poll, Musée Royal du Congo Belge; W. E. Schevill and C. G. Day, Woods Hole Oceanographic Institution; Stewart Springer, U.S. Fish and Wildlife Service; Carlos Teixeira, University of Lisbon; Ernest Williams, Museum of Comparative Zoology (Harvard).

SUMMARY

The sea turtle *Lepidochelys kempi* has an extensive range in coastal waters of the United States, and in parts of Florida is abundant as a seasonal resident. All known populations are sexually immature, and the breeding area of the species is not known. The present paper suggests the necessity of assuming a distant origin for the North American population, examines fragmentary evidence bearing on the corollary assumption of migratory movement, and somewhat hesitantly proposes the coast of northwestern Africa as a possible site of nesting. Spreading into American waters may occur via the Gulf Stream system. New records extend the range of the genus to northern Mauretania and into the Mediterranean.

RESUMEN

La tortuga marina *Lepidochelys kempi* tiene amplia distribución en el litoral de los Estados Unidos, y abunda como visitante en la costa occidental de Florida, si bien en la costa orientat hay un trecho desde Melbourne hasta Miami en que no ha sido registrada. Tampoco ha sido registrada en las Bahamas ni en las Antillas, aunque un ejemplar recogido en Cuba, mencionado por AGUAYO (1) parece ser la especie africana *L. olivacea,* que se debe considerar como visitante y ocasional de esas islas; también existe por lo menos un ejemplar registrado en las cercanías de Bermuda, y queda la posibilidad de que la "batalf" de Trinidad sea una u otra especie de *Lepidochelys.*

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Todas las poblaciones conocidas en aguas norteamericanas son sexualmente inmaturas, y no se conoce el criadero de la especie. En este trabajo el autor sugiere la necesidad de suponer un punto de origen distante para estas poblaciones; examina los fragmentos disponibles de evidencia que apoyan la suposición corolaria de mo imientos migratorios, y con algunas reservas propone la costa noroeste de Africa como sitio posible de anidaje. El sistema del Gulf Stream es probablemente la vía por la que se espa.cen en las agu.s de Norteamérica.

Nuevos records hacen extender los límites de distribución de la especie hasta Mauritania y el Mediterráneo.

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THE GREEN TURTLE *(CHELONIA MYDAS MYDAS)* IN FLORIDA[1]

1959

ARCHIE CARR
Department of Biology, University of Florida
AND
ROBERT M. INGLE
Director of Research, Florida State Board of Conservation, Tallahassee •

ABSTRACT

This paper records the first definite observations of nesting emergences of the Atlantic green turtle on the coast of North America. Two females were found laying their eggs on the East Coast of Florida, as follows: (1) two miles north of Vero Beach, Indian River County, July 11, 1957, T. C. Cheatham, observer; and (2) about a mile north of the House of Refuge Museum, Hutchinson Island, Martin County, June 27, 1958, R. C. Byrd, observer. Eggs from the latter nest were hatched by Mr. Ross Witham, and young are in the collections of the University of Florida. The possible desirability of using such Florida-oriented hatchlings (should more intensive searching show them to be available in worth-while numbers) in any future restocking project is discussed.

During the course of separate bibliographic studies of the primitive status of sea turtles in Florida (Ingle and Smith, 1949, Carr, 1952, 1956) the writers were struck by the scarcity of information on the character of green turtle populations in the state prior to the settling of the lower East Coast. Since the days when the earliest accounts of Florida resources and natural history were written the green turtle has been cited as a typically Floridian production. So consistently has Florida been named as a center of green turtle abundance that it comes as a surprise to find in print no definite record of a green turtle nesting on a Florida beach, or for that matter anywhere on the mainland of the United States.

The closest approach to such a record is to be found in Audubon's essay "The Turtlers" (1926), in which he says (p. 199) "On certain parts of the shore (of Florida) hundreds of turtles (by clear implication including green turtles) are known to deposit their eggs," and (p. 197) "I have several times observed them in the act (of laying)." Catesby said that the depleted green turtle populations of the Bahamas of his day no longer bred there but came from Cuba and the mainland. Holbrook (1842) implied that besides their breeding activity on Dry Tortugas, green turtles nested on Florida beaches. Although

[1]Results in part the outcome of work supported by National Science Foundation Grant G-5479.

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