THE AMERICAN ALLIGATOR

BY

KARL P. SCHMIDT

Assistant Curator of Reptiles and Amphibians

FIELD MUSEUM OF NATURAL HISTORY

CHICAGO

1922

THE AMERICAN ALLIGATOR.
FROM A MOUNTED SPECIMEN, PRESENTED BY MR. HARRY THURSTON, IN FIELD MUSEUM OF NATURAL HISTORY.

FIELD MUSEUM OF NATURAL HISTORY

DEPARTMENT OF ZOOLOGY

CHICAGO, 1922

LEAFLET

NUMBER 3

The American Alligator

The alligator is one of the best known of North American animals. Even in the northern states, its name and appearance are familiar to most people, whether through a picture post-card from a tourist friend in Florida, the sight of a souvenir baby "gator" or from a stuffed museum specimen. The name "alligator" is a corruption of the Spanish "El Lagarto," which means "the lizard." This term is still applied in some Spanish American countries to the crocodiles and caimans.

The American alligator is an excellent example of the group of reptiles known technically as the Crocodilia. This group includes the gavials, crocodiles, alligators, and caimans, and a few related forms which have no common English names. The gavial (genus *Gavialis*), of which there is only one form or *species*, has an extremely long and slender snout, with a large number of slender, projecting teeth. The crocodiles (genus *Crocodylus*) include several species with more or less tapering snouts and with fewer teeth.

Alligators and most caimans have broad shovel-shaped snouts, and differ from crocodiles in the position of the fourth lower tooth.

These forms may be called, collectively, "crocodilians." In all, there are twenty known living species and many more fossil forms. They are often of great size, ugly and vicious in appearance, and wholly carnivorous. They inhabit fresh water swamps, lakes

and rivers in tropical or subtropical countries, though two species, the Nile Crocodile (which is found throughout Africa), and the East Indian Crocodile, are known to swim boldly out to sea. These two species are also notable as the most seriously dangerous to human beings. They are all excellent and powerful swimmers and secure their food either in the water or from the neighboring banks. They are by no means exclusively aquatic, however, the true crocodiles, especially, being capable of active motion on land. All come ashore to sun themselves and to deposit their eggs. In size, the crocodilians are the largest of living reptiles. Some of the existing forms reach an occasional length of thirty feet, while the largest fossil forms are estimated at about fifty feet.

The American alligator with a maximum adult size of about sixteen feet is intermediate between these monsters and the smallest forms. One of the South American caimans is not known to reach a length of more than four feet.

Superficially, crocodiles resemble gigantic lizards, but with the exception of the general characters common to all reptiles, they are really widely distinct from lizards. By their large size they remind us of extinct dinosaurs and examination of their skulls and skeletons shows that they are really more closely allied to the dinosaurs than to the other groups of living reptiles (turtles, lizards and snakes, and the *Sphenodon* of New Zealand).

The fossil history of the Crocodilia is of great interest. Their mode of life insures the preservation of their remains more frequently than is the case with more terrestrial animals, with the result that the record of their ancestry is rather better known than that of most groups of reptiles. They reached their greatest development toward the close of the great

age of reptiles, the direct ancestors of modern crocodiles and alligators being contemporaries of the dinosaurs, the flying reptiles, and the gigantic sea lizards of the late Cretaceous period. Just as might be expected from their semi-aquatic habits, we find that some of these ancestral forms had taken to marine life and become almost wholly aquatic, perhaps coming ashore only for egg-laying.

There is great variation among the twenty living species of crocodilians in the length and breadth of the snout. The greatest degree of elongation of

Fig 1.

Skulls of Alligator (*Alligator mississippiensis*) Crocodile (*Crocodylus americanus*), and Gavial (*Gavialis gangeticus*), from left to right.

the snout is shown by the Indian gavial (*Gavialis gangeticus*.) The Indian name, "gharial," of which gavial is a corruption, means fish eater. Fish do in fact form the chief part of its food. They are caught by sudden sidewise lunges of the head and neck. In this movement a long slender snout offers much less resistance to the water than a broad one. The frequent tendency to elongation of the snout in other

crocodilians may be ascribed to similar habits and a similar need for mechanical efficiency. In the living forms (of the genus *Crocodylus*) this elongate snout is developed independently by three species, one in Australia, one in South America, and one in Central Africa. This is an example of what is called parallel evolution which is usually found in structures, like the slender snouts in question, definitely adapted to some special use. (Fig. 1).

How to distinguish an alligator from a crocodile is a question frequently asked. The greater breadth of snout which characterizes the alligator is illustrated above (in Fig. 1). The fourth lower tooth which is enlarged and fang-like in all crocodiles, fits into a pit inside the margin of the upper jaw in alligators and caimans, while in crocodiles it fits into a notch at the side of the upper jaw. From a side view, then, with the mouth closed, this enlarged tooth is concealed in alligators and caimans and visible in crocodiles. (Fig. 2). Alligators are distinguished

Fig. 2.

Side view of head of young American Alligator and Crocodile. Note the exposed lower tooth in the Crocodile.

by a special bridge of bone dividing the nasal opening of the skull, which is absent in caimans and crocodiles.

The appearance of the American alligator is familiar to everyone. Alligators are probably adult at a length of about eight feet. They continue to grow, however, after reaching this size, so that very old specimens reach much larger dimensions. The largest recorded size may be placed at about fifteen feet, but even twelve-foot individuals are now ex-

tremely rare, owing to the destruction of the large specimens for their hides. Young alligators are dark brown or black with bright yellow cross-bands. The lighter markings become less and less distinct with age, and very old specimens are a dull dark gray or black. The large, regularly arranged, plate-like scales on the back are underlain by plates of bone in the skin. These bony plates are absent in the skin of the belly, which is, therefore, more valuable for leather. Caimans and the African dwarf crocodile (*Osteolaemus*), have bony plates in the skin of the underparts, and in the caimans these plates are closely joined on the back and belly. Some fossil forms had an even more complete armor. The teeth are formidable. They are placed in regular sockets in the jaw-bones and are regularly shed, being replaced by new teeth growing into the hollow bases of the old ones. The head is remarkable for the nearly complete absence of flesh on its outer surface. There are no fleshy lips. The skin is so closely attached to the bone that it is impossible to detach it without destroying it.

There are many adaptations to life in the water in the alligator's body. The hind feet are fully webbed, the front feet slightly webbed. In active swimming, however, the legs are held at the sides and the body is propelled by sidewise strokes of the powerful tail. The tail is strongly flattened from side to side and the ridge of scales along its upper edge increases the propelling surface. The form of the head is such that the alligator can float at the surface of the water with only eyes and nostrils exposed. The nostrils can be closed by a valve-like flap of skin when it submerges. A similar arrangement of eyes and nostrils is found in many other animals that live in the water, the hippopotamus being a notable example among mammals. A complicated apparatus provides for the opening of the mouth at the surface of the

water where food is usually seized, without interfering with breathing. A valve in the throat closes the gullet while a bony palate separates the air chambers in the head from the mouth, the internal opening of the nostrils being at the very base of the skull instead of in the roof of the mouth, as in other reptiles. The gradual development of this bony palate can be traced in the fossil ancestry of the Crocodilia, and its progressive adaptation to special conditions is an impressive example of evolutionary change.

The American Alligator is found from the Rio Grande in Texas, in the streams and bayous of the

Fig. 3.

The distribution of living Alligators is shown in black on the map. The American Alligator (A) is found in southeastern North America; the Chinese Alligator (B), in eastern China.

Gulf coastal plain, throughout Florida, and in the Atlantic coastal plain north to North Carolina. In the Mississippi, it ranges northward as far as the Red River. In former times it was abundant throughout its range, but hunting for skins and sport has made it scarce nearly everywhere. Possibly its most important remaining strongholds are the Everglades of

Florida and the Okefinokee Swamp of southern Georgia.

Strangely enough, the only crocodilian which is closely enough related to the American alligator to be placed in the same genus by zoologists, is found in the Yang-tze River of eastern China. This is the small Chinese alligator (*Alligator sinensis*). This is less surprising when it is remembered that many of the most striking forms of animal and plant life in eastern North America have their nearest living relatives in China. This fact is illustrated by the tulip and sassafras among trees, the spoonbill sturgeon among fishes, and a number of common snakes and lizards besides the alligator, among reptiles.

The food of the alligator consists largely of fish. The young probably eat crawfishes and other small animals as well, and as they increase in size, a few mammals that come to the water and a few water-birds are added to the diet. Large alligators are able to capture animals as large as a deer, dragging them under water to drown and tearing the victim to pieces, often with the aid of another alligator, before swallowing. The diet of even the largest specimens probably consists chiefly of fish. The country inhabited by alligators is river-bottom land subject to overflow. During the spring floods, large numbers of fish find their way into the water-holes which are unconnected with the river at its normal level. As the season progresses and these holes dry out, the fish become more and more crowded and fall an easy prey to their enemies, among which the alligator is one of the most important, at least where it still occurs.

Human beings are rarely attacked by alligators. Even where large specimens are found, the hunters and natives most familiar with the habits of "gators" have no fear of them and bathe in the waters in which they live. In this respect, alligators and caimans dif-

fer from crocodiles, which are much more active and dangerous animals, although the American crocodile is less to be feared than the African or East Indian species.

Stones and pine knots are frequently found in the stomachs of alligators. Whether or not they are of any use in the digestion of food, like the pebbles in the gizzard of the bird, is unknown. Many extinct reptiles are known to have made similar collections of "stomach stones." The explanation of the hunters in the south, that they prevent the walls of the otherwise empty stomach from adhering during hibernation, is of course fanciful. Nearly everywhere in the United States, alligators hibernate for three or four months during the coldest part of the year. They bury themselves in the mud of the water-holes or swamps in which they live, and remain dormant until the approach of spring brings them out. In some tropical countries where the climate becomes too dry for the native crocodilians, they "aestivate" during a few months of the hottest and driest season, burying themselves in mud in the same way.

After emergence from their winter sleep, alligators feed for a time before the beginning of the breeding season, which occupies the late spring months. During the mating season the bellowing of the males is heard, and from the frequent mutilations of large specimens, it is presumed that fighting takes place between them at this time. The voices may be heard at a distance of a mile or more. A strong musky odor is discharged from the scent-glands at the sides of the throat when they are excited.

The female alligator prepares a nest for her eggs by biting off and carrying together a mass of vegetation such as grass, cat-tails and rushes. In this way a rounded or conical pile of trash is built up, not unlike a muskrat's nest, but placed at the edge or in the

neighborhood of the water. The pile is compacted by crawling back and forth over it. In this nest, the eggs, which average about thirty in number, are laid. The time of laying corresponds closely to the month of June, in Florida at least, and the hatching process occupies about eight weeks. The moist vegetation of the nest serves to prevent the drying out of the eggs and also protects them from the daily fluctuation in temperature. Possibly the heat from the decomposition of the materials of the nest aids the development of the eggs.

The mother alligator is said to guard the nest or at least to remain in its neighborhood during the development of the eggs, and at the time of hatching, she is supposed to assist the escape of the young by opening the nest. Unless this is the case, it is difficult to see how the young can force their way out, the mass of vegetation around the eggs having become very compact during the intervening time. There are no direct observations, of this habit, known to the writer. It is made very probable, however, by the existence of similar habits in the South American caimans and in the Nile Crocodile. It is well established that the latter animal digs the eggs out of the sand in which they are laid when the young are about to hatch, being notified at the proper time by the loud calling of the young crocodiles within the eggs, whose voices may be heard at a distance of several yards. Unhatched alligators also are able to make themselves heard at a considerable distance.

The newly hatched young are about eight inches long, while the average egg is about three inches in length. Their growth is fairly rapid. Specimens raised at the New York Zoological Society's Reptile House reached a length of five and a half feet, and a weight of fifty pounds, at the age of five years. Statements as to the extremely slow growth of alligators

are based on stunted specimens, kept in water that is too cold for them, and insufficiently fed. They are able to live for a long time without food, but naturally cannot be expected to grow under unfavorable conditions.

The use of alligator hides for leather has had a curious history. Not much use of alligator leather was made until 1855, when shoes and other objects made from it were in fashion for a brief season, and a few thousand skins were prepared. The leather went out of fashion again in a short time, but during the Civil War, the shortage of leather in the southern states led to a renewed demand for alligator skins, this time chiefly for boots and shoes. This use came to an end with the war, as the leather is really unsuited for shoes. The respite for the alligators, however, was a temporary one, for the leather again became fashionable about 1896, for use in fancy slippers and boots, traveling bags, pocketbooks, music rolls, etc. Since that time, the demand for alligator skins has been a steady one. It has been found that the skin of the back, the so-called "horn back", which was formerly discarded, can be tanned quite as well as that of the lower parts.

The number of skins of crocodilians used in the United States, as estimated by the U. S. Fish Commission, was about 280,000, in 1902. This may be considered an average figure for the preceding period, but with the increasing scarcity of alligators, it has probably decreased considerably since then. Of this large number of skins, about 120,000 were those of American alligators, the remainder being chiefly crocodile skins from Mexico and Central America.

Dr. A. H. Wright and W. D. Funkhouser, in their notes on the alligator in the Okefinokee Swamp, give a good account of what is probably the commonest method of hunting. They write:

"The methods of hunting the alligator, as prac-

ticed by the Lees and other inhabitants of the region, consist mainly of going out at night in small boats and locating the animals by means of a lamp fastened to the head of one hunter in the bow of the boat. Another hunter in the stern paddles or poles and uses the sharp end of the push pole to 'stick' the body after the animal has been shot and has sunk to the bottom. According to these hunters, who every year take out a large number of skins, the eyes of the small alligators appear red by the light thus used, while those of the large specimens are yellow. The hunter carrying the light swings his head from side to side through an arc of 180 degrees, and when an alligator is sighted, shoots it by the light of the lamp on his head. The common supposition that the skin of an alligator will turn the bullet of a gun is, of course, unfounded. Since, however, only the head of the animal is usually exposed when it is in the water, they are commonly shot through the eyes. The hunters generally use a shotgun loaded with buckshot. That a large number of alligators are annually secured in this manner is evidenced by the fact that the fields of the Lees are strewn with the skeletons and dorsal strips of skin which have been thrown away after each expedition. Only the ventral part of the skin is saved, the upper portions being too thick and spiny to admit of the primitive methods of tanning, and therefore, the crest and dorsal scales are not retained."

Alligators were formerly extremely numerous throughout their range, and their sluggish forms, often mistaken for stranded logs, were a familiar sight on the banks of every body of water in the South. Steady hunting for their skins during the past sixty years, the robbing of their nests for eggs, the capture of large numbers of the newly hatched young for "souvenirs", and wanton slaughter by so-called sportsmen, have decimated the species to such an extent that

few places are now left where it can still be said to be abundant. Perhaps the most important of these refuges are parts of the Florida Everglades and the great Okefinokee Swamp of southern Georgia. In these places, at least for the present, the alligator is probably safe from extinction. The great interest that the animal has for naturalists and its importance as one of the most characteristic North American animals, make its growing scarcity a matter of regret to all nature lovers.

The fact that the alligator is of such great interest to tourists (whether naturalists or not), may prove to be an important factor in saving the species from extinction. They seem to breed freely in captivity. The first "alligator farm" was established in 1895, and there are now at least eight "farms" in the United States. It would not be practicable to raise alligators for their skins alone, on account of their relatively slow rate of growth, but when the sale of baby alligators to tourists, the sale of larger specimens to zoological parks, and possibly an additional fee for visitors to the establishment are combined, the raising of alligators becomes a practical business.

The capture of wild alligators, alive, is by no means an easy process. It is effected by means of noosing, or with a large hook placed on the end of a pole which is inserted into the alligator's under-water retreat. The first farms where alligators were kept, were established primarily to accustom them to captivity and to taking food, preparatory to shipping them to zoological gardens, aquariums, and circuses. The demand for baby alligators for souvenirs led to the practice of hatching the eggs taken from the nests of wild alligators in incubators. This may be done by maintaining them at a temperature of 80 degrees F., and moistening them daily to prevent drying. Alligator

farms, however, proved to be a source of attraction for visitors, and at the larger of the modern establishments, the number of alligators on hand runs up to several thousand, of which probably a few hundred are of breeding age. They are kept in enclosures of wire netting, with concrete lined pools or streams. They must be assorted somewhat according to size, and extremely large individuals are given separate pens. There seems to be no authentic account of their breeding habits in captivity, and observations on this point would be of great interest. Alligator farming appears to be a successful enterprise, for in 1921, in addition to adult specimens sold to zoological parks, a single farm in Jacksonville, Florida, sold over ten thousand baby alligators.

KARL P. SCHMIDT,

Assistant Curator of Reptiles and Amphibians.

Books and articles containing information about alligators.

- BARBOUR, THOMASA Note Regarding the Chinese Alligator
(Proc. Acad. Nat. Sci. Phila., 1910,
pp. 464-67)
- DITMARS, R. L.The Reptile Book.
(New York, 1907)
- DITMARS, R. L.Reptiles of the World.
(New York, 1910)
- HORNADAY, WILLIAM T. ..The American Natural History.
(London, 1904)
- REESE, A. M.The Alligator and its Allies.
(New York, 1915)
- SMITH, H. M.Notes on the Alligator Industry.
(Bulletin U. S. Fish Commission,
XI, 1893, pp. 343-45)
- WILLISTON, S. W.Water Reptiles of the Past and Present.
(Chicago, 1914)
- WRIGHT, A. H. and
FUNKHAUSER, W. D.A Biological Reconnaissance of the
Okefinokee Swamp in Georgia.
(Proc. Acad. Nat. Sci. Phila., 1915,
pp. 136-39)

Alligators and their allies are represented in the Field Museum by a large mounted alligator, figured as the frontispiece to this leaflet, a mounted gavial, and a caiman. In the hall of osteology are complete skeletons of the American Alligator, American crocodile and the gavial.

A TYPICAL ALLIGATOR HOLE IN THE OKEFINOKEE SWAMP.

"'JOBING OR JABBING A 'GATOR.'"

PHOTOGRAPH BY MR. FRANCIS HARPER, LOANED BY DR. ALBERT H. WRIGHT.