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TURTLES COLLECTED BY THE
SMITHSONIAN BIOLOGICAL SURVEY
OF THE PANAMÁ CANAL ZONE

(WITH ONE PLATE)

BY
KARL PATTERSON SCHMIDT
Chief Curator of Zoology
Chicago Natural History Museum



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When my report on the collections of amphibians and reptiles of the Smithsonian Biological Survey of the Canal Zone was prepared in 1933,¹ the turtles of that collection were reserved by the late Dr. Leonhard Stejneger for study in connection with his long-continued project for a comprehensive review of the turtles of the North American continent. The 13 specimens of turtles in the collection are of interest in view of the importance of Panamá as the crossroads of turtle emigration from the north and of resurgence from the south; and a formal report upon them is required by the original contract between the Chicago Natural History Museum (at that time the Field Museum of Natural History) and the Smithsonian Institution. Panamá turtles available for comparison have been lent by the Museum of Comparative Zoölogy, the United States National Museum, the Carnegie Museum, and the Museum of Zoology of the University of Michigan. I am indebted to Arthur Loveridge, Dr. Doris M. Cochran, M. Graham Netting, and Norman Hartweg, respectively of these institutions, for their generous aid in this connection. I am especially indebted to Dr. E. R. Dunn, of Haverford College, for unpublished information made available for this report.

As far as can be discovered, the land and fresh-water turtles of Panamá include eight species:

<i>Chelydra acutirostris</i>	<i>Geoemyda annulata</i>
<i>Kinosternon postinguinale</i>	<i>Geoemyda funerea</i>
<i>Kinosternon panamensis</i>	<i>Geoemyda melanosterna</i>
<i>Pseudemys ornata</i>	<i>Testudo denticulata</i>

It is disappointing to find that actual information as to the distribution of these species in Panamá is still extremely scanty. The snapping turtle (*Chelydra*) and the land turtle (*Testudo*) are known from Panamá only from single specimens.

It is probable that representatives of all the genera of sea turtles occur on both the Pacific and Atlantic coasts of Panamá, but no

¹ Smithsonian Misc. Coll., vol. 89, No. 1, 1933.

actual records of sea turtles from that country are to be found in the literature. It is customary to distinguish the Atlantic sea turtles from those of the Pacific and Indian Oceans as follows: ²

Atlantic sea turtles	Pacific sea turtles
<i>Dermochelys coriacea</i>	<i>Dermochelys schlegelii</i>
<i>Chelonia mydas</i>	<i>Chelonia agassizii</i>
<i>Eretmochelys imbricata</i>	<i>Eretmochelys squamata</i>
<i>Caretta caretta caretta</i>	<i>Caretta caretta gigas</i>
<i>Lepidochelys kempii</i>	<i>Lepidochelys olivacea</i>

It must be pointed out that this partition is subject to a basic criticism, since the great majority of the littoral marine animals of the Pacific coast of Central America are more closely allied to Caribbean, and hence Atlantic, forms than to the more wide-spread representatives of the western Pacific and Indian Oceans.³ In the above list only *Chelonia agassizii* is based on specimens from the Central American Pacific coast. Thus the actual identification of the turtles of the American Pacific coast remains a problem of some interest.⁴

The land and fresh-water turtles of Panamá clearly represent a part of what Dunn⁵ refers to as the "Old Northern" element of the tropical American fauna. Even *Testudo denticulata*, though now a South American species reaching its northern limit in Panamá, is indirectly derived from the North American *Testudo*, though the genus appears as early as the Miocene in South America.⁶ With respect to the definition of a minor faunal province, the two species *Chelydra acutirostris* and *Geoemyda annulata* range to western Ecuador, and thus compare with a number of frogs, lizards, and snakes that have a similar range and a similar northern limit in Panamá. *Testudo denticulata* is a species of the Amazonian forest region that similarly reaches its northern limit in Panamá; *Kinosternon panamensis* represents the Amazonian *scorpioides* in Panamá; and *Pseudemys ornata* ranges from southern Mexico southward to Panamá and perhaps into western Colombia (Dunn, E. R.,

² See Stejneger, Leonhard, and Barbour, Thomas, Check-list of North American amphibians and reptiles, 5th ed. Bull. Mus. Comp. Zoöl., vol. 43, No. 1, 1943.

³ Ekman, Sven, Die Tiergeographie des Meeres. Leipzig, 1936.

⁴ Schmidt, K. P., Problems in the distribution of marine turtles. Marine Life Occ. Pap., vol. 1, No. 3, pp. 7-10, 1945.

⁵ Dunn, E. R., The herpetological fauna of the Americas. Copeia, 1931, pp. 106-119.

⁶ Simpson, G. G., A Miocene tortoise from Patagonia. Amer. Mus. Novit., No. 1209, pp. 1-6, 1942; Turtles and the origin of the fauna of Latin America. Amer. Journ. Sci., vol. 241, pp. 413-429, 1943.

in litt.). The forested region from Panamá to western Ecuador is sharply characterized by such remarkable forms as the tree frog *Agalychnis calcarifer* and the coral snake *Micrurus ancoralis*; and while its boundary is not yet adequately defined, this faunal province does not appear to extend beyond the mountain massif of Costa Rica. *Micrurus ancoralis* falls into two well-marked subspecies within this area. Differentiation of the turtles that characterize this Ecuador-Panamá fauna, such as *Chelydra acutirostris* and *Geoemyda annulata*, into corresponding subspecies is not demonstrated.

CLASS REPTILIA

Order CHELONIA

CHELYDRA ACUTIROSTRIS Peters

Chelydra serpentina var. *acutirostris* PETERS, Monatsber. Akad. Wiss. Berlin, 1862, p. 627 (Guayaquil, Ecuador).

Chelydra rossignonii (nec Bocourt) BOULENGER, Ann. Mag. Nat. Hist., ser. 7, vol. 9, p. 49, 1902; Vaillant, Miss. Mes. Arc. Mer. Equatorial, vol. 9 (Zool.), fasc. 2, p. 48, pls. 1-3, 1909; Boulenger, Proc. Zool. Soc. London, 1914, p. 814.

Chelydra serpentina (part) COPE, Proc. Acad. Nat. Sci. Philadelphia, vol. 24, p. 23, 1872.

This species is not included in the Smithsonian Survey collection but is represented in the Museum of Comparative Zoölogy by a single large specimen from Panama.

Comparison material

Mus. No.	Locality	Date	Collector
M.C.Z. 21669...	Coco Solo, Colón, C. Z.	1925	Thomas Barbour

As may be seen from the above synonymy, which omits references not based on specimens, the taxonomic status of the Ecuadorian snapping turtle has been in a state of considerable confusion. Cope, Günther, and Boulenger at first agreed to the distinction of *rossignonii* from Central America while referring Ecuadorian specimens to the North American *serpentina*. When Boulenger became convinced that the Ecuadorian snapping turtle should be distinguished, he applied the name *rossignonii*, rejecting Peters' earlier name *acutirostris* as "not accompanied by an adequate description." A single large specimen from Panamá in the collection of the Museum of Comparative Zoölogy and five specimens of *rossignonii* in the Chicago Natural History Museum, collected by myself in Honduras, enable me to re-examine the problem as to the distinction of the several supposed forms and to form an opinion as to the identity of the Panamá species.

The distinctness of the Central American snapping turtle from the North American form may be regarded as established. The adult specimens from Honduras before me all have a shorter and more angularly pointed head, four barbels on the chin instead of two, a slightly wider plastral bridge, and broader vertebral shields. In the skull the height at the quadrate is greater, .44 to .48, as compared with the length of the skull to the condyle, while in *serpentina* the same ratio is .38 to .43. In three skulls of *rossignonii* the width of the palatine ranges from .28 to .30 of the length of the skull, while in *serpentina* this ratio varies from .19 to .25.

The question as to the identity of the single Panamá specimen may be examined by means of the literature, since Boulenger (1902, loc. cit.) and Vaillant (1909, loc. cit.) give measurements of Ecuadorian specimens. Comparing the ratios of length of plastron, A, width of bridge, B, and width of second vertebral shield, C, all to the total length of carapace, the result is as follows:

	A	B	C
Ecuadorian specimens (6).....	.71-.77	.07-.12	.24-.27
Panamá specimen (1).....	.77	.09	.24
Honduras specimens (5).....	.77-.81	.06-.08	.32-.34

Thus, as far as may be determined from a single specimen, the Panamá snapping turtle is most closely allied to the Ecuadorian form, and should bear the name *acutirostris*. The specimen examined apparently has only one pair of short barbels; the head is acute, like that of *rossignonii*; and the growth rings are more evident than in the Honduran specimens (though these are smaller). There are five inframarginals on the right and four on the left side. The measurements of this specimen are as follows:

	mm.
Length of carapace.....	340.0
Width of carapace.....	286.0
Length of plastron.....	260.0
Width of plastral bridge.....	30.0
Width of 2d vertebral shield.....	82.0
Length of shielded top of head.....	97.0
Width of shielded top of head.....	79.0

KINOSTERNON POSTINGUINALE Cope

Cinosternum leucostomum COPE, Proc. Acad. Nat. Sci. Philadelphia, vol. 17, p. 189, 1865; Boulenger, Proc. Zool. Soc. London, 1898, p. 108; Peracca, Bol. Mus. Torino, vol. 19, No. 465, p. 2, 1904.

Cinosternum brevigulare COPE (nec Günther), Proc. Amer. Philos. Soc., vol. 2, p. 389, 1885 (type locality, Sipurio, Costa Rica).

Cinosternum postinguinale COPE, U. S. Nat. Mus. Bull. 32, p. 23, 1887 (substitute name for *brevigulare* Cope).

Three specimens, prepared as skin and skull, collected as follows :

U.S.N.M. No.	Locality	Date	Collector
53808.....	Gatún	March 1911	Meek and Hildebrand
53897.....	Frijoles	Feb. 13, 1911	" " "
54113.....	Panamá	....	E. A. Goldman

Comparison Material

Mus. No.	Locality	Date	Collector
C.M. 6878	Madden Dam, C. Z.	Aug. 16, 1933	A. M. Greenhall
C.M. 7700	Barro Colorado I., C. Z.	Mar. 21, 1934	M. Graham Netting
C.M. 7701	" " " "	" " " "	" " "
C.M. 7702	" " " "	" " " "	" " "
C.M.N.H. 13410..	" " " "	1928	K. P. Schmidt
U.M.M.Z. 63732..	" " " "	....	H. T. Gaige
U.M.M.Z. 63734..	" " " "	....	" " "
U.M.M.Z. 63735..	" " " "	....	" " "

All three of the Survey specimens are males; they exhibit the well-defined opposing patches of horny tubercles on the femoral and tibial joints of the leg. This character, with various others, amply distinguishes *postinguinale* from the forms allied to *scorpioides*.

The related species of the Chocó Region of Colombia, *Kinosternon spurrelli* Boulenger, in view of other faunal relations, might be thought to be referable to the Panamá form. Dr. Norman Hartweg (in litt.) regards it as at least subspecifically distinct, and suggests that *leucostomum*, *postinguinale*, and *spurrelli* may be regarded as a series of subspecies. The further examination of this question must be based on a much larger amount of material than is at present available.

KINOSTERNON PANAMENSIS, sp. nov.

Diagnosis.—A species of *Kinosternon* allied to *scorpioides*, with an elongate shell, keels present but less distinct than in *scorpioides*, the posterior end of the plastron only very narrowly notched, and the head of the adult male less enlarged. No postfemoral tubercles in the male. Distinguished from *integrum* by its larger and longer gular shield.

Range.—Panamá.

Type.—Cat. No. 117369, U.S.N.M. ♂; Panamá Railroad, C. Z., Panamá, June 10, 1932; Dr. Thomas Barbour, collector.

Description of type.—Carapace elongate, the sides parallel, with three barely distinguishable keels making the dorsal area flat; carapace descending abruptly behind with little outward flare of its posterior border; head large, upper jaw strongly hooked; outer four digits connected by web on both front and hind feet; plastron large, the posterior lobe feebly nicked; gular shield large, its length much more than half that of the anterior lobe; inguinal shield large, broadly in contact with the axillary; tail long, ending in a hooked horny nail; no trace of femoro-tibial horny tubercles; carapace dull brown, without markings; plastron yellow, unmarked; skin of soft parts apparently yellowish without definite markings, as is the case also with the darker horny shields of the jaws.

Measurements of type.—Length of carapace 150, width 93, depth 52.3; length of anterior lobe of plastron 42.0, width 68.0, length of gular shield 25; length of middle segment of plastron 39.0; length of posterior lobe 46.5, width 60; width of head 33.3; length of tail about 42.

Variation.—The nine paratypes include a series of dry shells of juvenile specimens, the smallest only 50 mm. in length, with very sharp dorsal keels, and with the costal fenestrae 60 percent of the costal length; in a specimen 93 mm. in length, with the keels still sharp, the fenestration is reduced to 10 percent of the costal length; while in a specimen measuring 124 mm. the keels are rounded. In the largest specimen, M.C.Z. No. 24957, a male, the length of carapace is 161 mm. The tail is very short in female specimens.

The list of the paratypes is as follows:

Mus. No.	Sex	Locality	Date	Collector
U.S.N.M. 7864	♂	Panamá	....	....
" 117370 ..	♀	"	....	Thomas Barbour
M.C.Z. 18930	♀	Ancón, C. Z.	....	" "
" 24957	♂	Panamá City	....	" "
" 27919	(shell)	Panamá City	....	E. R. Dunn
" 31486	"	Río Coclé, Penomoné	....	F. Jackson
" 31487	"	Río Grande, "	....	" "
" 31488 . . . .	"	" "	....	" "
" 31489 . . . .	"	" "	....	" "

Remarks.—This species of *Kinosternon*, not represented in the Survey collections, proves to be quite as abundant in Panamá as is *postinguinale*. Inspection of the series available convinces me that the Panamá form is more closely allied to the Guianan and Amazonian *scorpioides* than to the Mexican *integrum*, which is not otherwise known from Lower Central America, or even from Guatemala.

Typical *scorpioides* is widespread in South America, and there have been some attempts to partition it into subspecies. Müller and Hellmich⁷ conclude that the subspecific arrangement proposed by Siebenrock⁸ is untenable; Siebenrock gives the range of *scorpioides scorpioides* as the Guianas, entirely enclosed by that of *scorpioides integrum*, which is thought to extend from western Mexico to Pará and the Madeira River.

PSEUDEMYS ORNATA Gray

Emys ornata GRAY, Syn. Rept., p. 30, 1831.

Pseudemys ornata COPE, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, p. 153, 1876.

Chrysemys ornata BOULENGER, Cat. Chelon. Brit. Mus., p. 80, 1889.

Six specimens, cataloged in part as *Pseudemys grayi*, offer no distinctive differences from a series from British Honduras.

U.S.N. M. No.	Locality	Date	Collector
53882.....	Culebra (Río Cu)	Mar. 19, 1911	Meek and Hildebrand
53883.....	Alhojulla (Limón Creek)	Feb. 26, 1911	" " "
54085.....	Gatún	May 15, 1911	" " "
54086.....	Panamá	1911	" " "
54087.....	Panamá	1911	" " "
54088.....	Mindi Swamp	1911	" " "

Comparison material

M.C.Z. No.	Locality	Date	Collector
3937.....	San Pablo	1874	Allan Lesley
25089.....	Barro Colorado I.	1927	Thomas Barbour
28200.....	" " "	1929	E. R. Dunn
31485.....	Penomoné, Coclé Prov.	1931	F. Jackson
31693.....	Panamá	1909	Thomas Barbour
31694.....	Margarita Swamp near Colón	1925	" "

Within the great recorded range of *ornata*, from Sinaloa to Panamá (and perhaps to the Chocó in Colombia, per E. R. Dunn, in litt.), geographic variation is to be expected. The range of the species does, however, appear to be continuous—it is the common fresh-water turtle in Guatemala, Honduras, and apparently in Costa Rica and Panamá. I have examined four additional specimens in the Museum of Comparative Zoölogy, from San Pablo, Penomoné, and Colón, and it is recorded also from Barro Colorado Island.

⁷ Müller, Lorenz, and Hellmich, Walter, Wiss. Ergeb. Deutsch. Gran Chaco-Expedition. Amph. Rept., pt. 1, p. 96, 1936.

⁸ Siebenrock, Franz, Zool. Jahrb., Suppl., vol. 10, p. 445, 1909.

GEOEMYDA ANNULATA Gray

Geoclemmys annulata GRAY, Proc. Zool. Soc. London, 1860, p. 231, pl. 29.

[*Geoemyda*] *annulata* DUNN, Proc. New England Zool. Club, vol. 12, p. 32, 1930.

Rhinoclemmys gabbii ALLEE, Ecology, vol. 7, p. 451, 1926.

Two specimens in the Canal Zone Survey collection, with other material examined from Panamá as follows:

U.S.N.M. No.	Locality	Date	Collector
50250.....	Panamá	February 1911	E. A. Goldman
54009.....	"	....	" " "

Comparison material

Mus. No.	Locality	Date	Collector
U.S.N.M. 7571	Panamá	....	....
" 59877 .....	"	....	....
M.C.Z. 22297	Barro Colorado I.	1926	E. R. Dunn
" 28196	" " "	1929	" " "
C.M.N.H. 6124	" " "	1924	W. C. Allee
" 13428	" " "	1928	K. P. Schmidt

The remarkable infestation of *Geoemyda annulata* by a tick that attacks the bony carapace at the sutures between the horny plates is reported by Allee and Allee.⁹ Every shell examined exhibits traces of infestation by such ticks, which leaves characteristic and unmistakable scars (pl. 1). The head and neck of *Kinosternon postinguinale* also tend to be attacked by ticks, presumably of the same species, to judge from the specimens in the Carnegie Museum.

The type locality of *Chelopus gabbii* Cope being Costa Rica, this name would be available should a northern race of *annulata* be distinguishable. I have no Ecuadorian specimens at hand, and follow Dunn in referring Panamá specimens to the Ecuadorian species.

GEOEMYDA FUNEREA Cope

Chelopus funereus COPE, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 8, p. 154, 1876.

[*Geoemyda*] *funerea* DUNN, Proc. New England Zool. Club, vol. 12, p. 31, 1930.

This species is added to the Panamá fauna on the authority of Dr. E. R. Dunn (in litt.). I have not seen specimens.

⁹ Allee, W. C., and Allee, Marjorie H., Jungle islands, p. 101, fig. 43. Rand McNally, Chicago, 1925.

GEOEMYDA MELANOSTERNA Gray

Geoclemys melanosterna GRAY, Proc. Zool. Soc. London, 1861, p. 205.

This species was described from "Cherunha, Gulf of Darien" (then Colombia), and Dunn (in litt.) informs me that he has seen a more recent specimen from the Rio Chucuhaqué, Panamá.

TESTUDO DENTICULATA Linnaeus

Testudo denticulata LINNAEUS, Systema naturae, ed. 12, p. 352, 1758.

The single male specimen, U.S.N.M. No. 50251, is without data other than Panamá. I find no other record from Panamá for this species; it is abundant in Venezuela and in the Santa Marta region of Colombia, and may be supposed to have a continuous distribution along the Colombian Caribbean coast.

CHELONIA AGASSIZII Duméril and Bocourt

A single juvenile specimen, U.S.N.M. No. 51500, from Chame Point, collected by Robert Tweedlie represents the green turtle in the Smithsonian Survey collection. This locality is in the Gulf of Panamá. A single juvenile specimen in the collections of the Museum of Comparative Zoölogy, from the Hassler Expedition, is also presumably from the Pacific side. There is obviously no opportunity to open the question as to the distinctions between *Chelonia agassizii* and *Chelonia mydas* on the basis of available collections.

CARETTA CARETTA Linnaeus

A single juvenile specimen, U.S.N.M. No. 46390, was collected from the coasts of Panamá by J. M. Dow. Without information as to which coast it came from, and no comparative material, this specimen obviously affords no information as to the differences between the loggerheads of the two sides of the Isthmus.



ANTERIOR PART OF CARAPACE OF *GEOMYDA ANNULATA*. SHOWING
TYPICAL INFESTATION BY A TURTLESHELL TICK (X 1½)