

IDENTITY OF *CROCODILUS MEXICANUS* BOCOURT, 1869 (REPTILIA: CROCODYLIDAE)

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Abstract.—Examination of type material and analysis of Central American crocodile neck squamation indicate that *Crocodilus mexicanus* is a synonym of *Crocodylus moreletii*.

Crocodilus mexicanus Bocourt, 1869 was recognized for less than twenty years (Sumichrast 1880, 1882, 1884; Cope 1887, as a subspecies of *C. americanus*) until Günther (1885) synonymized it with *Crocodylus moreletii* Duméril and Bibron, 1851 (as *C. americanus* var. *moreletii*). In 1889 Boulenger transferred *C. mexicanus* to the synonymy of *Crocodilus americanus* Laurenti, 1768 (= *Crocodylus acutus* Cuvier, 1807) as suggested by Gray (1872). Since Boulenger's action, the specific allocation of this taxon has been uncertain and most subsequent authors have merely followed Boulenger uncritically.

Crocodilus mexicanus was described from two specimens: an adult received at the Muséum National d'Histoire Naturelle, Paris (MNHN 7579), from Tampico in 1845 and referred to as "variété à dix écussons cervicaux" of *C. acutus* by Duméril and Duméril (1851), and Duméril (1852); along with a juvenile.

Crocodilus mexicanus was said to differ from *C. acutus* by head shape, color, and neck squamation, but was not compared to *C. moreletii*. The figure of the adult syntype (Bocourt 1873, pl. 8, fig. 3) showed a large crocodile with ten neck shield or nuchal scales, and dark coloration. This plate also showed regular tail squamation, and a distinct preorbital hump, two character states associated with *C. acutus*.

Analysis of the number of neck scales in

C. acutus and *C. moreletii*, based on museum specimens and material examined in Mexico and Central America, and a re-examination of MNHN 7579, the adult syntype of *C. mexicanus*, now permit a more definitive specific allocation of this taxon and confirms Smith and Smith's (1977) tentative allocation of *C. mexicanus* to the synonymy of *C. moreletii*.

Analysis of variation in neck squamation used data from 170 crocodiles from Mexico and Central America north of Panama. Our criteria for distinguishing between *C. acutus* and *C. moreletii* are many, but most are subtle and some vary individually. Two reliable characters were found: the presence or absence of basicaudal scale row irregularity (Ross and Ross 1974), and the shape of the premaxillary-maxillary suture (Schmidt 1924). These characters are used by us to identify this sample as containing 70 *C. acutus*, and 100 *C. moreletii* (as shown in Table 1).

Nape scales (PC 25 + 26; terminology of Ross and Mayer 1983 = post-occipital scales of Deraniyagala 1939; King and Brazaitis 1971; Brazaitis 1974; Ross and Roberts 1979) and neck shield scales (PC 20 + 21, 22 + 23 and rarely PC 19 and 24 = nuchal scales as above) were counted. The most common condition in both *C. acutus* and *C. moreletii* is 4 nape scales (60% *C. acutus*, 64% *C. moreletii*) and 6 neck shield scales (60% *C. acutus*, 85% *C. moreletii*). How-

Table 1.—Frequency distribution of number of neck scales in crocodiles from Mexico and Central America north of Panama. Analysis of neck shield scales and nape scutes utilized data from 70 *C. acutus*, and 98 (neck shield) and 100 (nape scutes) *C. moreletii*. Neck shield, Chi square = 38.99, 5 d.f., $P < 0.01$. Nape scutes, Chi square = 63.81, 5 d.f., $P < 0.01$.

Neck shield (PC 19–24)	Number of scales					
	3	4	5	6	7	8
<i>C. acutus</i>	4	18	4	43	1	0
<i>C. moreletii</i>	0	1	1	87	5	4

Nape scutes (PC 25–26)	2	3	4	5	6	7
<i>C. acutus</i>	13	14	43	0	0	0
<i>C. moreletii</i>	0	0	64	15	20	1

ever, the distribution of these traits is significant and helps to distinguish *C. acutus* (fewer neck scales) from *C. moreletii* (Table 1). Only one *C. acutus* (FMNH 23147 from Isla Cozumel, Mexico), had more than 6 neck shield scales and two *C. moreletii* (FMNH 123668 and MCZ 8047 from northeastern Mexico and Quintana Roo, Mexico, respectively) had less than 4 nape scales or 6 neck shield scales.

A discriminant analysis (BMDP7M; Dixon 1975) of these data was performed. The adult syntype of *C. mexicanus*, MNHN 7579, which has 4 nape and 10 neck shield scales, was entered without species identity. It was assigned to *C. moreletii* with a 99% probability.

Examination of MNHN 7579 showed that this specimen also exhibits basicaudal scale row irregularity, a distinctive characteristic of *C. moreletii* (Ross and Ross 1974). This characteristic was not mentioned in the original description, or later redescription, and the figure of MNHN 7579 (Bocourt 1873, pl. 8, fig. 3), which is accurate in most details, was inaccurate for this trait as it clearly shows regular basicaudal scale rows, a condition found in *C. acutus* in Mexico and Central America (Ross and Ross 1974).

The juvenile syntype of *C. mexicanus* has not been located. Bocourt (1869) stated that it originated in the same locality as the adult, i.e., Tampico, but later (1873) gave the locality only as “Mexique.” Bocourt (1869) described this specimen, the juvenile syntype, as being no larger than 79 cm and possessing 8 neck shield scales. Owing to the number of neck shield scales it is likely to be referable to *C. moreletii* for the reason outlined above. Because the juvenile is missing, has questionable locality data, and since the nature of its basicaudal tail squamation and shape of the premaxillary-maxillary suture cannot be determined, we designate MNHN 7579, the mounted, ca. 2 m long adult, as lectotype of *C. mexicanus*.

Crocodylus mexicanus Bocourt, 1869
Crocodylus mexicanus Bocourt, 1869:20, 1873:34.—Sumichrast, 1880:171, 1882:276, 1884:34.
Crocodylus americanus var. *moreletii* (part.): Günther, 1885:21.
Crocodylus americanus mexicanus: Cope, 1887:20.
Crocodylus americanus (part.): Boulenger, 1889:281.—Cope, 1900:173.
Crocodylus moreletii (part.): Schmidt, 1924:84.—Smith and Smith, 1977:95.
Champsia acuta (part.): Werner, 1933:17.
Crocodylus acutus acutus (part.): Smith and Taylor, 1950:211.
Crocodylus acutus (part.): Wermuth, 1953:476.—Mertens and Wermuth, 1955:408.—Wermuth and Mertens, 1961:359, 1977:141.—Steel, 1973:62.—Alvarez del Toro, 1974:13.—Smith and Smith, 1976:Cr-10.

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Literature Cited

- Alvarez del Toro, M. 1974. Los Crocodylia de Mexico (Estudio Comparativo). Editorial Libros de México, México, ix + 70 pp.
- Bocourt, M. 1869. Descriptions de quelques reptiles et poissons nouveaux appartenant à la faune tropicale de l'Amérique.—Nouvelles Archives du Museum 5:19–24.
- . 1873. Études sur les reptiles. Mission scientifique au Mexique et dans l'Amérique Centrale—recherches zoologiques. Troisième Partie, 2^e Livraison, pp. 33–112. Imprimerie Impériale, Paris.
- Boulenger, G. A. 1889. Catalogue of the Chelonians, Rhynchocephalians, and Crocodiles in the British Museum (Natural History). Taylor and Francis, London, x + 311 pp.
- Brazaitis, P. 1974. The identification of living crocodilians.—Zoologica 58(3–4):59–101.
- Cope, E. D. 1887. Catalogue of batrachians and reptiles of Central America and Mexico.—Bulletin of the United States National Museum 32:1–98.
- . 1900. The crocodilians, lizards, and snakes of North America.—Report of the United States National Museum for 1898:153–1270.
- Deraniyagala, P. E. P. 1939. The tetrapod reptiles of Ceylon. Volume 1. Testudines and Crocodilians. Colombo Museum of Natural History, Colombo, xxxii + 412 pp.
- Dixon, W. J. 1975. (Ed.) B.M.D.P., biomedical computer programs. University of California Press, Berkeley, xi + 792 pp.
- Duméril, A. H. A. 1852. Description des reptiles nouveaux ou imparfaitement connus de la collection du Muséum d'Histoire Naturelle.—Archives du Muséum 6:209–264.
- Duméril, A. M. C., and A. H. A. Duméril. 1851. Catalogue méthodique de la collection des reptiles. Gide et Boudry, Paris, iv + 224 pp.
- Gray, J. E. 1872. Catalogue of shield reptiles in the collection of the British Museum. Part 2. Emydosaurians, Rhynchocephalia, and Amphisbaenians. Taylor and Francis, London, vi + 41 pp.
- Günther, A. 1885. Biologia Centrali-Americana. Reptilia and Batrachia. Taylor and Francis, London, xx + 326 pp.
- King, F. W., and P. Brazaitis. 1971. Species identification of commercial crocodilian skins.—Zoologica 56(2):15–70.
- Mertens, R., and H. Wermuth. 1955. Die rezenten Schildkröten, Krokodile und Bruckeneschen.—Zoologische Jahrbücher (Systematik) 83(5):323–440.
- Ross, C. A., and F. D. Ross. 1974. Caudal scalation of Central American *Crocodylus*.—Proceedings of the Biological Society of Washington 87:231–234.
- , and C. D. Roberts. 1979. Scalation of the American Alligator.—United States Department of the Interior, Fish and Wildlife Service, Special Scientific Report—Wildlife, 225:1–8.
- Ross, F. D., and G. C. Mayer. 1983. On the dorsal armor of the Crocodilia. Pp. 305–331 in A. G. J. Rhodin and K. Miyata, eds., Advances in herpetology and evolutionary biology—essays in honor of Ernest E. Williams. Harvard University, Cambridge.
- Schmidt, K. P. 1924. Notes on Central American crocodiles.—Field Museum of Natural History Publication 220, Zoological Series 12(6):79–92.
- Smith, H. M., and R. B. Smith. 1976. Synopsis of the herpetofauna of Mexico. Volume 3. Source analysis and index for Mexican reptiles. John Johnson, North Bennington, Vermont.
- , and ———. 1977. Synopsis of the herpetofauna of Mexico. Volume 5. Guide to Mexican Amphisbaenians and Crocodilians. Bibliographic Addendum 2. John Johnson, North Bennington, Vermont, 187 pp.
- , and E. H. Taylor. 1950. An annotated checklist and key to the reptiles of Mexico exclusive of the snakes.—United States National Museum Bulletin 199:1–253.
- Steel, R. 1973. Crocodylia.—Encyclopedia of Paleoherpetology 16(16):vii–116.
- Sumichrast, F. 1880. Contribution à l'histoire naturelle du Mexique. 1. Notes sur une collection de reptiles et de batraciens de la partie occidentale de l'Isthme de Tehuantepec.—Bulletin de la Société Zoologique de France 5:162–190.
- . 1882. Contribucion á la historia natural de México. 1. Notas acerca de una coleccion de reptiles y batracios de la parte occidental del Istmo de Tehuantepec.—La Naturaleza 5:268–293.
- . 1884. Enumeracion de las especies de reptiles observados en la parte meridional de la República Mexicana.—La Naturaleza 6:31–45.
- Wermuth, H. 1953. Systematik der rezenten krokodile.—Mitteilungen aus dem Zoologischen Museum, Berlin 29:375–514.
- , and R. Mertens. 1961. Schildkröten, Krokodile, Brückenechsen. Gustav Fischer, Jena, xxvi + 422 pp.
- , and ———. 1977. Das Tierreich. Liste der rezenten Amphibien und Reptilien. Testudines,

Crocodylia, Rhynchocephalia. Walter de Gruyter, Berlin, xxvii + 174 pp.

Werner, F. 1933. Das Tierreich. Loricata. Walter de Gruyter, Berlin and Leipzig, xiv + 40 pp.

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