A New Species of *Chelodina* (Testudines: Chelidae) from Eastern Timor Island (East Timor)

By William P. McCord[1], Mehdi Joseph-Ouni[2], and Cris Hagen[3]

[1]East Fishkill Animal Hospital, Hopewell Junction, NY 12533, USA.
[2]EO Wildlife & Wilderness Conservation, Brooklyn, NY 11228, USA.
[3]Savannah River Ecology Laboratory, Aiken, SC 29802, USA.

Abstract. After years of occasional *Chelodina* specimens reportedly originating from East Timor, a recent field trip involving these authors has confirmed this range extension for the genus; leading here to the description of a morphologically distinct species, *Chelodina timorensis* **sp. nov.** This new species is biogeographically isolated (allopatric) from all previously known snake-necked turtle populations. A formal description and diagnosis are given herein.

Key words: Turtle, Pleurodira, chelid, *Chelodina timorensis* **sp. nov.**, Timor Island, East Timor.

Extant species of side-necked turtles (Pleurodira Cope, 1864) are assigned to three families: Chelidae Gray, 1825, Podocnemidae Cope, 1868, and Pelomedusidae Cope, 1868. Within the family Chelidae, the genus *Chelodina* Fitzinger, 1826, includes species of snake- or long-necked turtles. Historically (GOODE, 1967; BURBIDGE et al., 1974) and recently (GEORGES et al., 2002), *Chelodina* has been designated as comprising first two, then three subgeneric groups: A (= *Chelodina*), B (= *Macrochelodina* Wells and Wellington, 1985), and C (unnamed, containing only *Chelodina oblonga* Gray, 1841, = *Chelodina colliei* Gray, 1856).

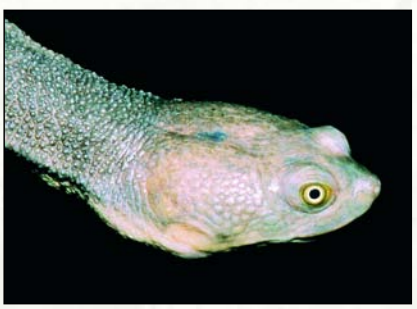
Chelodina of East Timor are morphologically similar to species in subgeneric group A, also called the "*Chelodina longicollis* group"; the East Timor *Chelodina* population is thus herein designated a member of subgeneric group A. The turtles of this subgeneric group have generally narrower, more rounded heads, longer intergular scutes, vestigial barbels, shorter and thinner necks with tubercles, and broader plastrons. More specifically, *Chelodina* of East Timor are morphologically similar to species of the *Chelodina novaeguineae* complex — within subgeneric group A (see McCORD and THOMSON, 2002); the East Timor *Chelodina* population is thus herein designated a member of the *Chelodina novaeguineae* complex. Shared characters in species of the *Chelodina novaeguineae* complex include enlarged anterior bridge struts, wide triturating surfaces, narrow parietal crests, relatively more robust heads (for subgeneric group A) and shells, and an overall brown coloration.

Timor Island is 8 to 10 million years old. It is 600 kilometers long and 80–100 kilometers wide, and is very mountainous. From May to October, southeasterly trade winds blow in from Australia creating the dry season. From November to April, northwesterly monsoons bring humidity from the South China Sea creating the wet season.

The *Chelodina* of East Timor do not share habitat (are not sympatric) with any other chelonian. Introduced *Chinemys reevesi* (Gray, 1831) were found in the Dili area, but not in the vicinity of Lake Ira Lalaro with the *Chelodina*.

Chelodina timorensis AMNH (AMCC) #167210. Photo: G. Cosentino

Chelodina timorensis habitat. Lake Ira Lalaro in dry season. Photo: C. Hagen



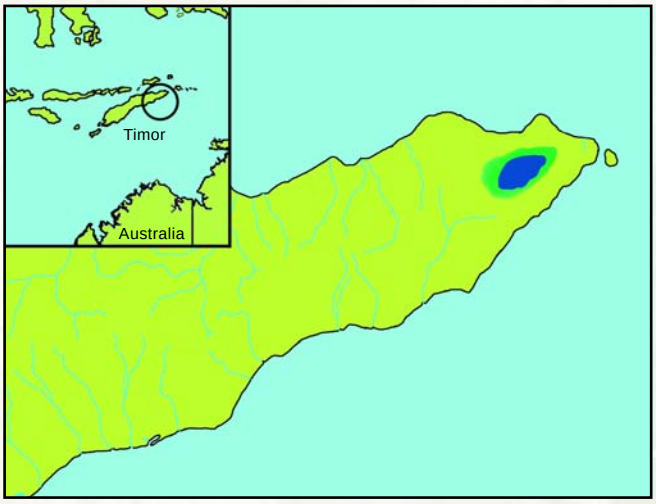
Chelodina timorensis, head and neck. Photo: W. P. McCord

Chelodina timorensis holotype AMNH #R-160135 — carapace. Photo: W. P. McCord

Chelodina timorensis holotype AMNH #R-160135 — plastron. Photo: W. P. McCord

At the present time, the threats to the eastern Timor species of *Chelodina* are local consumption and the agricultural practices of the Fataluku-speaking natives (HAGEN, pers. obs.). The turtles disperse with the floodwaters of the wet season. When these waters recede during the dry season, the turtles are left to aestivate, digging into the ground to conserve moisture. At the same time, to facilitate the planting of crops, many seasonally dry areas are burned, which in turn kills any turtles that are not buried deep enough underground (HAGEN, pers. obs.). Political turmoil and violence in East Timor has prevented the pet trade from having a significant impact on the *Chelodina* population there (GUNALEN, HAGEN, YUWONO, pers. obs.). If increased pet trade puts higher demand on this *Chelodina* population in the future, the rate of losses will become unsustainable.

Within the *Chelodina novaeguineae* complex, the only species of *Chelodina* from which the eastern Timor population needs to be differentiated in detail here is *Chelodina mccordi* Rhodin, 1994, from Rote (Roti) Island. These two species are biogeographically and morphologically closer to each other than to any other species of *Chelodina*. Molecular analyses (in prep.) will further clarify the specific status of each form.



Note Lake Ira Lalaro and it's floodplains. This is the entire known distribution of *Chelodina timorensis*.

In all other (non-Rote/Timor) *Chelodina* belonging to both subgeneric group A and the *Chelodina novaeguineae* complex, the dorsal surface area of the first marginal scute of the carapace is equal to or greater than that of the second marginal scute, and the fifth vertebral scute is wider than it is long. In *Chelodina* from Rote and Timor, the dorsal surface area of the second marginal is always significantly greater than that of the first marginal, and the fifth vertebral scute is longer than it is wide.

Chelodina belonging to subgeneric group A but not to the *Chelodina novaeguineae* complex differ from Rote and Timor specimens morphologically, as already described (McCORD and THOMSON, 2002), as do all *Chelodina* belonging to subgeneric groups B and C as already described (GOODE, 1967; BURBIDGE et al., 1974).

After many years working with *Chelodina* specimens from eastern Timor, we present here an original description of the isolated East Timor species. This is published to provide a public and permanent scientific record. Date of publication: *Reptilia* (GB) no. 52 (no. 65/ES and no. 14/IT), Castelldefels, Spain, mailed 1 June 2007.

Taxonomy

TIMOR LONGNECK TURTLE
Chelodina timorensis **sp. nov.**
Order Testudines Linnaeus, 1758
Suborder Pleurodira Cope, 1864
Family Chelidae Gray, 1825.

Holotype (designated herein). American Museum of Natural History (AMNH) #R-160135: a juvenile, preserved in alcohol, purchased from native villagers by Frank Yuwono, originally collected in the swamps of Lake Ira Lalaro, East Timor.

Other Material. AMNH Ambrose Monell Cryo Collection (AMCC) #'s 167209 and 167210: tissue (blood) from two subadults, purchased from native villagers by Frank Yuwono, originally collected in the

Chelodina timorensis holotype AMNH #R-160135 — frontal view. Photo: W. P. McCord

swamps of Lake Ira Lalaro, East Timor; live in the senior author's collection.

Type locality. Lake Ira Lalaro, Lautem District (regency), Tutuala Subdistrict, eastern East Timor (= Timor-Leste; = Timor Lorosa'E).

Distribution. Known only from the lake itself and the permanent and temporary swamps/floodplains of Lake Ira Lalaro, eastern East Timor.

Etymology. Named for Timor Island, where the turtle naturally occurs.

Description

Head. The head in both sexes is fairly robust for *Chelodina* subgeneric group A (ranked fifth after *C. reimanni*, *C. canni* from eastern Queensland, *C. mccordi* from eastern Rote, and *C. gunaleni*). It has small mildly elevated irregular scales on the masseters; a narrow (relative to head width) parietal roof; a group of three to five small barbels, the paramedian pair being largest; a blunt and mildly sloped snout; and a triturating surface of intermediate width for subgeneric group A. The iris in some specimens is whitish-yellow in the center with a gray-black periphery and schlera; in other specimens the iris is white in the center with a yellow periphery, bordered by a gray/black ring surrounded by a yellow schlera. The dorsal head color is a brownish gray with some mild black muting (degree of melanism). The tympanum, mandible, and underside of the head are a yellowish white.

Neck. The neck is 60–65% as long as the carapace length. It bears moderately based, rounded tubercles. Dorsal coloration of the neck is gray with mild black muting. Ventral coloration of the neck is white.

Carapace. The carapace length is known from studied specimens to reach at least 169 millimeters, and is suspected to reach larger sizes. It is generally ovate, widest at the seventh marginal scute, and fairly smooth (not rugose), with a shallow median groove in subadult specimens, a vestigial median keel in subadult specimens, and no natural growth rings. The length of the nuchal scute is 7.5% of the carapace length; the first marginal is always smaller in dorsal surface area than the second marginal; the fourth to the seventh (lateral) marginals are negligibly upturned in subadult specimens; the sixth to the eighth marginals flare; the seventh to the tenth marginals have a scalloped appearance in adults; the supracaudals (M12) are negligibly elevated over the tail; and the fifth vertebral is longer than it is wide. Carapace coloration is an olive-brown background color with mild black muting.

Plastron. Relative to the plastral length, the plastral width is low (56%) for subgeneric group A (average 59%); relative to carapace length, the plastral width is average (46%) for subgeneric group A. The width at the inguinal notch is 95% of the width at the axillary notch; the width at the femoral/anal seam is 64% of the width at the humeral/pectoral seam. The plastral lobes narrow going both anteriorly and posteriorly; the anterior plastral lobe is wider than the posterior plastral lobe; the anterior edge of the plastron does not reach the caudal border of the ventral marginals when viewed from below. The distance between the humeral seams of the intergular scute increases going posteriorly; the gular/intergular seams are equal to or shorter than the humeral/intergular seams; the gular/humeral seams are shorter than the gular/intergular seams. The plastral seam formula is IG scute length > IAb > IAn > IF > IP > IG. There is a shallow anal notch. Bridge length relative to carapace length is intermediate for subgeneric group A. Axillary and inguinal scutes are absent. The ventral surface of the sixth marginal scute is 56% of the width of ventral seventh marginal. The ventral seventh marginal aligns with (helps form the border of) the anterior inguinal notch; the pectoral/abdominal seam meets the marginals at or just caudal to the fifth/sixth marginal seam at the sixth marginal scute. The plastron is equally flat in both sexes. Plastral coloration is a pale yellow with varying degrees of black muting on the intergular/pectoral seams and the medial 40–50% of the abdominal, femoral, and anal scutes.

Adult males are suspected to be smaller than adult females, and to have thicker, longer tails. There are five horizontal scales on the dorsal surface of each foreleg. Soft parts are gray-black dorsally and gray-white ventrally.

Diagnosis

The following differentiates *Chelodina timorensis* sp. nov. from its biogeographically and morphologically closest congener *C. mccordi*, found on nearby Rote Island. Of the characters given in the foregoing description, only those that differentiate *C. timorensis* from *C. mccordi* are given here.

Head. The head of *C. timorensis* is 25% less robust (HW x HD/HL) than the head of eastern (Lake Enduy) *C. mccordi*, and is 9% more robust than western (Lake Lidor) *C. mccordi*. The parietal roof of *C. timorensis* is

Photographic identification key for *Chelodina timorensis*: step 1 – note M1 is smaller than M2; step 2 – note V5 is longer than wide; step 3 – note the humeral/intergular scute seams are longer than the gular/intergular scute seams. Plastral view, AMNH (AMCC) #167209. Photos: G. Cosentino

9% narrower (PW/HW) than that of all populations of *C. mccordi*. The interorbital width of *C. timorensis* is 18% less (IOW/HW) than that of all *C. mccordi*. The iris is white in the center with a light yellow periphery in *C. timorensis*; it is more uniformly yellow-gold in eastern and western *C. mccordi* populations. The schlera is yellow or muted yellow in *C. timorensis*; it is usually black in all *C. mccordi*. The dorsal head color of *C. timorensis* is a muted gray, whereas in all *C. mccordi* it is a muted brown. The tympanum, mandible, and underside of the head are whiter in *C. timorensis* than the creamy yellow in all *C. mccordi*.

Neck. The neck of *C. timorensis* bears moderately based rounded tubercles; the neck tubercles in all *C. mccordi* are more or less bluntly pointed. The dorsal neck color of *C. timorensis* is a muted gray, whereas that of all *C. mccordi* is usually muted to the point of being black; the ventral neck color of *C. timorensis* is whiter than the creamy yellow of all *C. mccordi*.

Carapace. The carapace of *C. timorensis* is 20% less robust (CW x CD/CL) than that of all *C. mccordi*. The carapace of *C. timorensis* is fairly smooth, whereas that of *C. mccordi* is mildly rugose. In subadult *C. timorensis*, the fourth to seventh (lateral) marginal scutes are negligibly upturned; these scutes are mildy upturned in all *C. mccordi*. In adult *C. timorensis* the seventh to tenth marginals have a scalloped appearance, which is absent in all *C. mccordi*. The supracaudals (M12) are more elevated over the tail in *C. mccordi* than in *C. timorensis*. Carapace coloration in *C. timorensis* is a uniform olive brown, whereas in *C. mccordi* varying shades of brown lack an olive tint.

Plastron. The width of the plastron at the femoral/anal seam is 36% narrower than the width at the humeral/pectoral seam in *C. timorensis*, whereas it is 26% narrower in *C. mccordi*. The gular/intergular seams are equal to or shorter than the humeral/intergular seams in *C. timorensis*, whereas the gular/intergular seams are much longer than the humeral/intergular seams in all *C. mccordi*. The ventral surface of the sixth marginal scute is 44% narrower than that of the seventh marginal in *C. timorensis*; compared to being from 20% narrower to 15% wider in *C. mccordi*. The pectoral/abdominal seam of *C. timorensis* meets the marginals at or just posterior to the fifth/sixth marginal seam at the sixth marginal scute, whereas in *C.*

Data Table for *Chelodina timorensis* **sp.nov.**

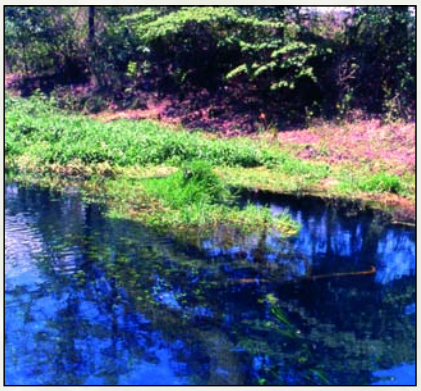
	CL	CW6	CW7	CW8	CD	V1L	V2L	V3L	V4L	V5L	V1W	V2W	V3W	V4W	V5W	M1L
AMNH #R-160135	74.70	55.08	55.10	51.96	26.16	17.11	12.52	10.31	10.86	14.13	19.33	25.30	26.48	25.19	12.03	7.91
AMCC #167210	169.21	126.00	126.80	122.19	67.62	37.87	32.85	27.27	25.70	33.67	44.24	37.81	33.83	26.91	28.81	18.67
AMCC #167209	141.54	105.66	106.29	101.44	47.54	31.50	22.50	17.58	18.98	29.88	34.67	39.63	37.86	25.95	23.81	13.56

Morphometric Key

CL = straight midline carapace length; CW6,7,8 = straight carapace width at 6th, 7th, and 8th marginals; CD = maximum carapace depth; V1–5L = vertebral number length; V1–5W = vertebral number width; M1–2 L & R = marginal #1–2 length left and right side; PL = midline plastral length; PWA = plastral width at axillary notch; PWI = plastral

Chelodina timorensis AMNH (AMCC) #167209. Photo: G. Cosentino

Chelodina timorensis AMNH (AMCC) #167210. Photo: G. Cosentino



Chelodina timorensis habitat. Lake Ira Lalaro. Photo: C. Hagen

mccordi the pectoral/abdominal seam meets the marginals at the fifth/sixth marginal seam (western population) or anterior to the fifth/sixth marginal seam at the fifth marginal scute (eastern population). The black muting extends more laterally (30–40% scute widths) from the intergular/pectoral and median plastral scute seams in *C. timorensis* than in *C. mccordi*, in which the black muting tends to be darker and stay close to the scute seams.

Note the diagnostic characters given in the introduction for other *Chelodina* species. ■

Acknowledgements

We thank Mr. Frank Yuwono of Jakarta for his help obtaining the specimens studied; Patrick Baker, Roger Bour, Greg Cosentino, Minh Le, and Steven Winchell for reviewing this paper; and Christopher Raxworthy, David Kizirian, and David Dickey for facilitating the specimen accession at the AMNH.

Bibliography

BURBIDGE, A. A., J. A. W. KIRSCH, and A. R. MAIN. 1974. Relationships within the Chelidae (Testudines: Pleurodira) of Australia and New Guinea. *Copeia* 1974: 392–409.

COPE, E. D. 1864. On the limits and relations of the Raniformes. *Proc. Acad. Nat. Sci. Philadelphia* 16: 181–183.

COPE, E. D. 1868. An examination of the Reptilia and Batrachia obtained by the Orton expedition to Equador [sic] and the upper Amazon, with notes on other species. *Proc. Acad. Natur. Sci. Philadelphia* 20: 96–140.

FITZINGER, L. J. F. J. 1826. *Neue Classification der Reptilien nach ihren Natürlichen Verwandtschaften nebst einer Verwandtschafts-Tafel und einem Verzeichnisse der Reptilien-Sammlung des k. k. Zoologischen Museum zu Wien.* J. G. Hübner, Wien.

GEORGES, A., M. ADAMS, and W. P. McCORD. 2002. Delineation of species boundaries and a phylogeny for the snake-necked freshwater turtles of Australasia (Testudines: Chelidae: Chelodina). *Zool. Journal of the Linnean Society* 134: 401–421.

GOODE, J. 1967. *Freshwater Tortoises of Australia and New Guinea (in the Family Chelidae).* Lansdowne Press, Melbourne, Victoria, Australia.

GRAY, J. E. 1825. A synopsis of the genera of reptiles and amphibia, with a description of some new species. *Ann. Philos.* (new ser.) 10: 193–217.

GRAY, J. E. 1831. *Synopsis Reptilium or short descriptions of the species of reptiles. Part 1. Cataphracta, tortoises, crocodiles, and enaliosaurians.* Treuttel, Wurtz & Co., London.

GRAY, J. E. 1841. A catalogue of the new species of reptiles and amphibia hitherto described as inhabiting Australia, with a description of some new species from Western Australia. Appendix E, pp. 422–449. In: G. Grey. *Journals of Two Expeditions of Discovery in Northwestern and Western Australia, during the years 1837, 38, and 39, under the authority of Her Majesty's Government.* Vol. 2. T. and W. Boone, London.

GRAY. J. E. 1856. On some new species of freshwater tortoises from North America, Ceylon and Australia, in the collection of the British Museum. *Proc. Zool. Soc. London*, 1855 (1856): 197–202.

LINNAEUS, C. 1758. *Systema Naturae*, 10th ed. Holmiae. 1: 1–824.

McCORD, W. P., and S. A. THOMSON. 2002. A New Species of Chelodina (Testudines: Pleurodira: Chelidae) from Northern Australia. *Journal of Herpetology* 36(2): 255–267.

RHODIN, A. G. J. 1994. Chelid turtles of the Australian archipelago: I. A new species of *Chelodina* from southeastern Papua New Guinea. *Breviora* 498: 1–31.

RHODIN, A. G. J., and R. A. MITTERMEIER. 1976. *Chelodina parkeri*, a new species of chelid turtle from New Guinea, with a discussion of *Chelodina siebenrocki* Werner, 1901. *Bull. Mus. Comp. Zool. Harvard* 147: 465–488.

WELLS, R. W., and R. C. WELLINGTON. 1985. A Classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology*, Supplementary Series No. 1: 1–61.

M1R	M2L	M2R	PL	PWA	PWI	PWHP	PWFA	BL	IG	IGSL	IP	IAb	IF	IAn	HL	HW	HD	IOW	PRW
7.21	9.95	9.94	59.34	32.25	30.24	29.14	19.45	14.66	2.60	21.41	6.00	12.66	8.90	9.26	22.20	16.30	11.50	2.70	2.57
16.51	20.65	20.86	142.30	78.07	74.29	70.93	46.00	34.55	6.11	50.50	13.34	28.91	18.27	24.52	40.50	30.00	20.47	4.04	21.93
12.27	17.74	17.12	114.33	63.86	59.80	58.74	37.20	28.01	6.25	40.48	10.38	21.25	13.88	19.86	31.35	24.77	16.47	3.55	3.15

width at inguinal notch; PWHP = plastral width at humeral/pectoral seam; PWFA = plastral width at femoral/anal seam; BL = bridge length; IGSL = intergular scute length; IG, IP, IAb, IF, IAn = midline plastral inter-scute seam lengths; HL = head length; HW = head width at tympana; HD = maximum head depth; IOW = inter-orbital width; PRW = parietal roof width.