

Pelomedusa subrufa (Lacépède 1788) – Helmeted Turtle, Helmeted Terrapin

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SUMMARY. – The helmeted turtle, *Pelomedusa subrufa* (Family Pelomedusidae), is a medium-sized species with a continental distribution in Africa south of the Palearctic Region. The species appears to be very successful, common, and under no threat. In the more arid regions of southern Africa, and probably elsewhere, the species appears to be expanding its range as a result of the construction of farm dams and reservoirs.

DISTRIBUTION. – Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Congo (DRC); Congo (ROC); Eritrea; Ethiopia; Gambia; Ghana; Guinea; Ivory Coast; Kenya; Lesotho; Madagascar; Malawi; Mali; Mozambique; Namibia; Nigeria; Rwanda; Saudi Arabia; Senegal; Sierra Leone; Somalia; South Africa; Sudan; Swaziland; Tanzania; Togo; Uganda; Yemen; Zambia; Zimbabwe. Distributed widely throughout Africa from Somalia and Ethiopia in the northeast (including the southwestern Arabian Peninsula) to Senegal and Mali in the northwest, southwards through central and eastern Africa to southern Africa, as far south as the Cape Peninsula and Madagascar.

SYNONYMY. – *Testudo subrufa* Lacépède 1788; *Emys subrufa*; *Pelomedusa subrufa*; *Chelys (Hydraspis) subrufa*; *Hydraspis subrufa*; *Pelomedusa galeata subrufa*; *Pelomedusa subrufa subrufa*; *Testudo galeata* Schoepff 1792; *Emys galeata*; *Hydraspis galeata*; *Pelomedusa galeata*; *Pentonyx galeata*; *Hydraspis (Pelomedusa) galeata*; *Pelomedusa galeata galeata*; *Testudo badia* Donndorff 1798; *Testudo rubicunda* Suckow 1798; *Emys olivacea* Schweigger 1812; *Hydraspis (Pelomedusa) olivacea*; *Pelomedusa subrufa olivacea*; *Pentonyx capensis* Duméril and Bibron 1835; *Emys (Emys) capensis*; *Pentonyx gehafie* Rüppell 1835; *Pelomedusa galeata gehafie*; *Pelomedusa subrufa gehafie*; *Pentonyx americana* Cornalia 1849; *Pelomedusa nigra* Gray 1863; *Pelomedusa galeata nigra*; *Pelomedusa subrufa nigra*; *Pelomedusa gasconi* Rochebrune 1884; *Pelomedusa galeata disjuncta* Vaillant and Grandidier 1910; *Pelomedusa galeata damarensis* Hewitt 1935; *Pelomedusa subrufa damarensis*; *Pelomedusa galeata devilliersi* Hewitt 1935; *Pelomedusa galeata orangensis* Hewitt 1935; *Pelomedusa subrufa orangensis*; *Pelomedusa subrufa wettsteini* Mertens 1937

SUBSPECIES. – None currently recognized; previously three: *P. s. subrufa* (Common African Helmeted Turtle), *P. s. olivacea* (North African Helmeted Turtle), and *P. s. nigra* (Black Helmeted Turtle).

STATUS. – IUCN 2007 Red List: Not Listed (= Least Concern, LR/lc) (assessed 1996, needs updating); CITES: Not Listed, previously Appendix III (Ghana).



Figure 1. Adult male *Pelomedusa subrufa*, north of Cap Ste. Marie, southern Madagascar, January 2007. Photo by Anders G.J. Rhodin.



Figure 2. Adult male *Pelomedusa subrufa*, north of Cap Ste. Marie, southern Madagascar, January 2007. Photos by Anders G.J. Rhodin.

Taxonomy. — This species was originally described as *Testudo subrufa* by Lacépède in 1788 from Madagascar. For many years, the name *Testudo galeata* Schoepff was used by taxonomists until it was indicated by Mertens (1937), and supported by Loveridge (1941), that *Testudo subrufa* Lacépède pre-dated *T. galeata* Schoepff. Initially the type locality was given as ‘Cape’ by Loveridge (1941) but has since been corrected to Taolanaro (Fort Dauphin), Madagascar by Bour (1979, 1982). A new genus, *Pelomedusa*, was proposed by Wagler in 1830. A number of species and subspecies of *Pelomedusa* have been described from southern Africa and Madagascar (see Loveridge 1941). While placing these forms in the synonymy of *Pelomedusa subrufa subrufa*, Loveridge (1941) retained the use of trinomials as he recognized *Pelomedusa subrufa olivacea* (Schweigger)

from Senegal to Eritrea. The primary distinguishing feature being the separation of the pectoral shields of the plastron (Loveridge 1941; Pritchard 1979). A poorly defined race in southeastern southern Africa, *Pelomedusa subrufa nigra* Gray, with dull coloration and a black plastron, although synonymized by Loveridge (1941), is recognized by some authors (Bour 1986; Branch 1998). Bour (1986) recognized two subspecies in southern Africa, *Pelomedusa subrufa nigra* in Natal, Orange Free State, and Eastern Cape Province; and the typical form *Pelomedusa subrufa subrufa* from the rest of southern Africa, extending northwards through east Africa to Somalia in the northeast and Ghana in west Africa, and in Madagascar and the Mascarenes. Great variation in the color and pattern of the plastron was noted in the Swaziland population (Boycott 2001) and the same may be true of other southern African populations. For example, specimens from the Little Karoo region also appear, from the description provided by Branch and Bauer (1995), to have a variable plastral color pattern. The diagnostic features of *nigra* as described by Gray (1863) and Bour (1986) seem superficial. As pointed out by Branch et al. (1995) and Boycott (2001), a fuller analysis of the situation in southern Africa is required in order to determine the validity of *P. s. nigra*. Gasperetti et al. (1993) examined a large series of museum types and concluded that the subspecies characters were not consistent, and they also indicated the need for a re-evaluation of the diagnostic features for the currently recognized subspecies. Neither Ernst et al. (undated), Fritz and Havas (2007), nor the Turtle Taxonomy Working Group (2007) recognized any subspecies of *P. subrufa*.



Figure 3. Hatchling *Pelomedusa subrufa*, north of Morondava, western Madagascar, January 2008. Photos by Anders G.J. Rhodin.

Description. — *Pelomedusa subrufa* is a medium-sized terrapin with a typical carapace length ranging from 200–300 mm. The largest specimen on record is a male in the Kaffrarian Museum, presumably from the eastern Cape Province of South Africa, with a CL of 325 mm and a carapace width of

245 mm (Boycott and Bourquin 2000). Males attain a larger size than females and weigh up to 3 kg. Females reach a CL of 290 mm and weigh 2.2 kg.

Males differ from females in respect of size, shell shape, and tail length. Although there is no obvious plastral concavity in males, there is a definite upturning of the femoral shields laterally. By comparison, females have flat or convex femoral shields. The design of the femoral shields helps prevent the male from sliding off the female's shell during mating. The tail in males is long, its tip extending well beyond the anterior edge of the last marginal shield; whereas, in females the tail is short and stubby and the tip rarely extends beyond the anterior edge of the last marginal.

The head is broad, the snout short, and the neck long and muscular. On the chin, a single pair of small barbels is present. Forelimbs are flat and paddle-like; the hindfeet webbed. The toes have only two phalanges. Five sharp claws are present on all limbs.

The shell is flattened considerably and circular or oval in shape. By contrast, the shell of the hinged terrapins (*Pelusios*) is thicker, more domed and more elongated than that of *Pelomedusa*. The plastron of *Pelomedusa* is rigid and

has no hinge. The anterior edge of the plastron is truncated, not rounded, and falls short of the anterior edge of the carapace.

The carapace is dark brown, gray, or black, with or without light-colored vermiculations. Vermiculations are more conspicuous in young terrapins. Hatchlings have a gray carapace. On the periphery of the shell, and restricted to the marginal shields, yellow-brown patches are present and are separated by black patches along the sutures between the marginal shields. The plastron is variable and can be entirely black, uniformly horn-colored, or marked symmetrically with dark brown and yellow patches. Along the periphery of the plastron alternating black and yellow triangular markings are often present on the marginal shields. The bridge between the plastron and carapace is lighter than the rest of the plastron.

Dorsally the head, neck, limbs and tail are uniformly olive-brown, gray, or black. Ventrally the head is uniformly white to yellow. Black specks may be scattered unevenly over the surface of the head, neck, limbs and tail. Males from the Ivory Coast have been seen with red spotted, nearly white heads (Bull and Legler 1980).

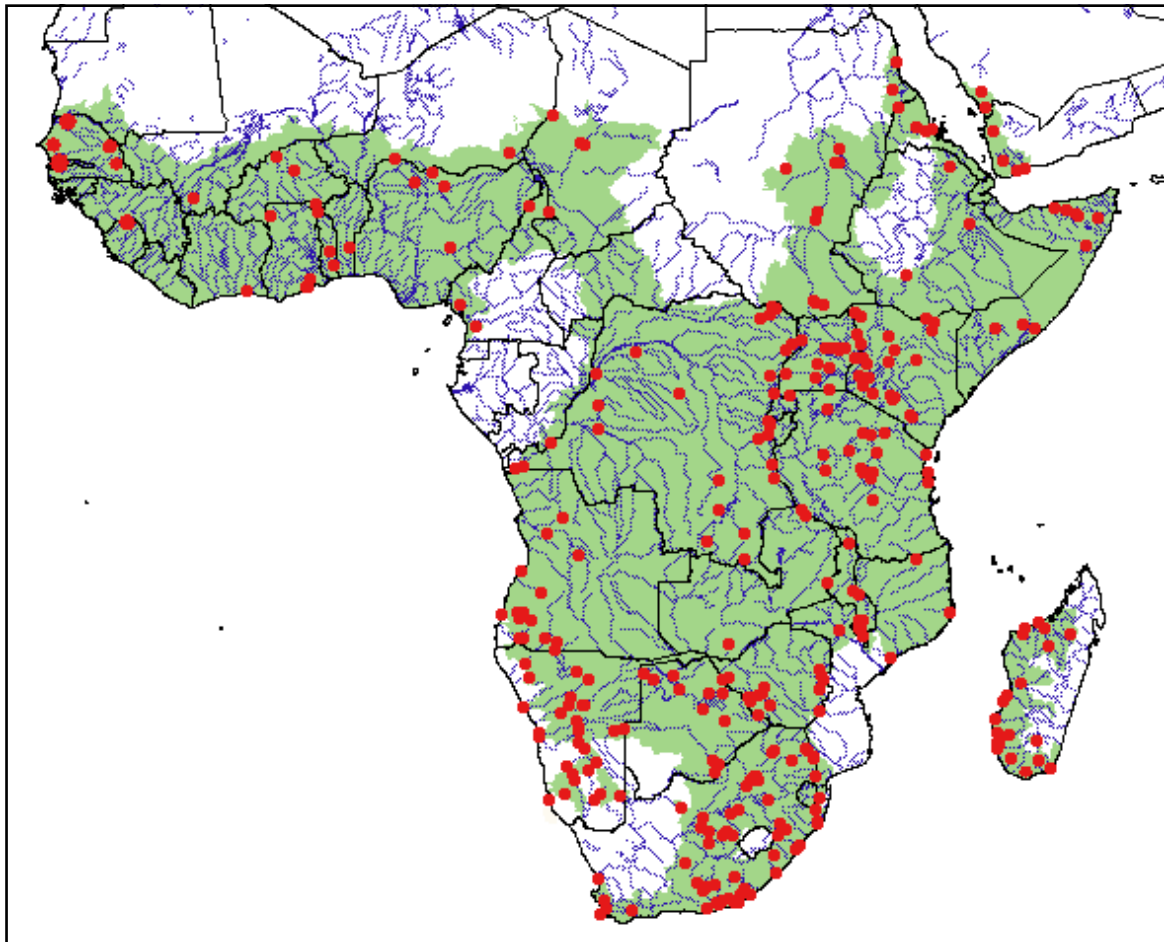


Figure 4. Distribution of *Pelomedusa subrufa* in Africa. Red points = museum and literature occurrence records based on Iverson (1992) plus more recent and authors' data; green shading = projected distribution based on GIS-defined hydrologic unit compartments (HUCs) constructed around verified localities and then adding HUCs that connect known point localities in the same watershed or physiographic region, and similar habitats and elevations as verified HUCs (Buhlmann et al., unpubl. data), and adjusted based on authors' data.

A karyotype of $2n = 34$ has been reported by Stock (1972), Kiester and Childress (in Gorman 1973) and Kilbrew (1975), but Bull and Legler (1980) reported it as $2n = 36$, with 5 pairs of macrochromosomes and 13 pairs of microchromosomes.

Distribution. — *Pelomedusa subrufa* occurs throughout sub-Saharan Africa from the Cape Peninsula to the Sudan (Boycott and Bourquin 2000). It also occurs on Madagascar and the Mascarenes (Henkel and Schmidt 1995), but not in the Seychelles (Gerlach 2000) as reported by Henkel and Schmidt (1995). The previously recognized northern race, *P. s. olivacea* (Schweigger), occurs in the drier regions immediately south of the Sahara desert in a trans-African belt from Senegal to the Sudan, Ethiopia, and Somaliland (Loveridge 1941), and in the extreme southwest of Saudi Arabia and in Yemen (Ernst et al., undated; Gasperetti et al. 1993). The previously recognized nominate race occurs throughout the rest of Africa from the Cape Province of South Africa northwards, circumventing the tropical rain forest belt in central and west Africa, and extending into Senegal. Intermediates with the northern race occur over a wide belt from Somaliland through northern Kenya and Uganda to Senegal (Loveridge 1941). In southern Africa, the species occurs from sea level to an altitude of 1600 m and elsewhere on the continent it has been recorded up to 3100 m (Ernst et al., undated). The species is generally absent from mountainous terrain, forests, and sandy desert regions. The range of the species as depicted in the distribution map is based on various regional surveys and checklists (Broadley 1971; De Waal 1980; Jacobsen 1989; Iverson 1992; Bauer et al. 1993; Bates 1996; Bourquin 2004).

Habitat and Ecology. — *Pelomedusa subrufa* occurs throughout Africa in a wide range of habitats from the temperate fynbos and grassland habitats of South Africa to the subtropical savanna and semi-desert regions of east central Africa and west Africa. It is a resilient terrapin that has adapted to harsh environmental conditions. Throughout the continent these terrapins are most active during the wet season and will aestivate during the cold dry season. As a measure of its adaptability and tolerance of varied climatic and environmental conditions, at the southern limit of its range it occurs in the winter rainfall region of South Africa where it is active in the cold, winter months. In this region, in order to escape the harsh summer conditions, these terrapins aestivate during the hot and dry summer months. The species occurs wherever there are seasonal pans and marshes, and takes advantage of man-made farm dams; thereby expanding its range into otherwise unsuitable habitats, including semi-desert regions. The species generally avoids mountainous terrain, forest, and desert.

Pelomedusa subrufa has managed to occupy an ecological niche where competition with the hinged terrapins (*Pelusios*) and softshell turtles (*Cycloderma*, *Cyclanorbis*, and *Trionyx*) is reduced or absent. The species has the ability to move great distances overland to occupy the smallest temporary pan, pool, or puddle while the hinged and softshell turtles are more selective in occupying permanent bodies

of water. There are a few instances where *Pelomedusa* has been recorded from the same water body as *Pelusios*, but this is rare. Jacobsen and van der Waal (1995) recorded the species microsympatric with *Pelusios sinuatus* and *P. subniger* from a shallow pool along the Motloutse River near Selebi Pikwe in Botswana and Hoffman and van der Bank (2001) recorded the same three species together in a temporary pan, near Lower Sabie, in Kruger National Park, South Africa.

Pelomedusa subrufa is primarily carnivorous and feeds on a wide range of prey including amphibians (adults and larvae), fish, crabs, ticks, mollusks, birds, and small mammals. It is also not averse to feeding on rotting carcasses. A small portion of its diet comprises waterweeds and their roots. The species will occasionally stalk unsuspecting birds drinking at the edge of pans, and once seized the bird is dragged into the water where it is soon drowned, torn apart by one or more terrapins and devoured. Any food obtained on land is taken into the water to be eaten.

The dry season throughout most of Africa coincides with the cold winter months. However, in the southern part of South Africa, which falls into the winter rainfall region, the dry season coincides with the hot summer months. As the dry season approaches and the temporary pans and ponds dry up, the terrapins leave the pans, burrow underground, and aestivate until favorable conditions return. By aestivating, terrapins avoid the veld fires that rage through the dry season in most of Africa, and in some areas they survive exceedingly low temperatures. Generally, increased temperatures and the onset of the first rains awaken the terrapins from their inactive state and they move off in search of suitable pans and marshes. However, in the southern part of South Africa the terrapins become active after the onset of the winter rains when temperatures start to fall. In some instances terrapins remain in permanent bodies of water such as farm dams throughout the year without aestivating or hibernating (Boycott and Bourquin 2000).

Throughout most of Africa mating occurs during spring after the onset of the rains and nesting takes place during the summer months. In the southern part of South Africa, in the winter rainfall region, courtship, mating, and nesting have been observed during the autumn (April and May) (C. McDowell, pers. comm.). After choosing a suitable site in the vicinity of the water body the female will commence digging a nest in which to deposit her eggs. The terrapin excavates a nest chamber about 18 cm deep and 9 cm wide. Depending on the size of the female, 10–30 leathery-shelled eggs are laid per clutch, although as many as 42 eggs have been recorded. Eggs measure 25–40 mm by 18–30 mm and a mass of 10–15 g.

After an incubation period of approximately three to six months, the hatchlings emerge. In the summer rainfall region of southern Africa, the incubation period is approximately three months (Boycott and Bourquin 2000); whereas, in the winter rainfall region in the southern part of South Africa the incubation period is five to six months (C. McDowell, pers. comm.). This is probably due to the lower tempera-

tures at this time. In the summer rainfall region of southern Africa, hatchlings emerge from their nests in mid- to late summer (February to April) (Boycott and Bourquin 2000). In the winter rainfall region in the southern part of South Africa hatchlings emerge in spring (September to October) (C. McDowell, A. de Villiers, and A. Turner, pers. comm.). In the lowlands of western Madagascar hatchlings emerge during the winter in late January (A. Rhodin, pers. comm.). The hatchlings have a CL of 25–35 mm and a mass of 4–10 g (Boycott and Bourquin 2000).

Defense mechanisms include musk glands located next to the 4th and 8th marginal scutes on each side, which can secrete a foul-smelling fluid (Loveridge 1941) the moment the terrapin is picked up. These terrapins will use their feet to disturb mud and sediment on the bottom of a pool, thereby obscuring their position when being attacked (Boycott and Bourquin 2000). They are also capable of inflicting a painful bite and of scratching with their claws. They can defecate and urinate freely when handled.

Population Status. — This species is very common and widespread throughout its continental range and its status is secure. In many areas populations have benefited from man-made water bodies, such as ponds and dams (Boycott and Bourquin 2000). In Madagascar, the species appears quite common in the western and southern lowlands and is frequently encountered in road puddles (A. Rhodin, pers. comm.). The species is widespread in Madagascar, as Loveridge's (1941) comment about the species occurring at "many localities" seems to indicate.

Threats to Survival. — Reduction in habitat over the long term, through the filling-in of temporary pans and the draining of marshes, could affect all species of terrapin, including the more common species. The Madagascar and Mascarene populations might be more vulnerable as a result of habitat loss over the short term.

Conservation Measures Taken. — The species occurs in many protected areas throughout Africa and also occurs in some protected areas in Madagascar. The species was placed on CITES Appendix III by Ghana in 1976, which meant that the export of the species from Ghana was regulated, but it has recently been delisted by the Ghana CITES Authority.

Conservation Measures Proposed. — The species is under no immediate threat as suitable natural and man-made habitats inside and outside of protected areas are abundantly available throughout much of its continental range. For potentially threatened island populations, protected areas should be designated and the species protected through national legislation.

Captive Husbandry. — The species breeds readily in captivity in southern Africa and abroad. Individuals have survived in captivity for over 20 years.

Current Research. — None known.

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LITERATURE CITED

- BATES, M.F. 1996. New reptile distribution records for the Free State Province of South Africa. *Navors. nas. Mus. Bloemfontein* 12:1-46.
- BAUER, A.M., BRANCH, W.R., AND W.D. HAACKE. 1993. Herpetofauna of the Kamanjab area and adjacent Damaraland, Namibia. *Madoqua* 18:117-146.
- BOUR, R. 1979. Les tortues actuelles de Madagascar (République malagache): liste systématique et description de deux sous-espèces nouvelles (Reptilia: Testudines). *Bull. Soc. Sci. Anjou. N.S.* 10(1978):141-154.
- BOUR, R. 1982. *Pelomedusa subrufa* (Lacepède, 1788), *Pelusios subniger* (Lacepède, 1788) (Reptilia, Chelonii) et le séjour de Philibert Commerson à Madagascar. *Bull. Mus. Natn. Hist. Nat., Paris.* 4e ser., 4 A:531-539.
- BOUR, R.H. 1986. Note sur *Pelusios adansonii* (Schweigger, 1812) et sur une nouvelle espèce affine du Kenya (Chelonii, Pelomedusidae). *Stud. Palaeochelon.* 2:23-54.
- BOURQUIN, O. 2004. Reptiles (Reptilia) in KwaZulu/Natal: 1 – diversity and distribution. *Durban Museum Novitates* 29:57-103.
- BOYCOTT, R.C. 2001. The terrapins and tortoises (Chelonia: Pelomedusidae and Testudinidae) of Swaziland. *Durban Museum Novitates* 26:25-37.
- BOYCOTT, R.C. AND BOURQUIN, O. 2000. The Southern African Tortoise Book – A Guide to Southern African Tortoises, Terrapins and Turtles. Published by O. Bourquin, Pietermaritzburg, South Africa.
- BRANCH, B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town, South Africa.
- BRANCH, W.R. AND BAUER, A.M. 1995. Herpetofauna of the Little Karoo, Western Cape, South Africa with notes on life history and taxonomy. *Herpetological Natural History* 3:47-89.
- BRANCH, W.R., BENN, G.A., AND LOMBARD, A.T. 1995. The tortoises (Testudinidae) and terrapins (Pelomedusidae) of southern Africa: their diversity, distribution and conservation. *South African Journal of Zoology* 30:91-102.
- BROADLEY, D.G. 1971. The reptiles and amphibians of Zambia. *The Puku* 6:1-143.
- BULL, J.J. AND LEGLER, J.M. 1980. Karyotypes of side-necked turtles (Testudines: Pleurodira). *Canadian Journal of Zoology* 58:828-841.
- CITES. 2007. Appendices I, II and III valid from 13 September 2007. www.cites.org/eng/app/index.shtml.
- CORNALIA, E. 1849. *Vertebratum Synopsis in Museo Mediolanense Extantium*. Modoetia: Corbetta, 16 pp.
- DE WAAL, S.W.P. 1980. The Testudines (Reptilia) of the Orange Free State, South Africa. *Navors. Nas. Mus. Bloemfontein* 4:85-91.
- DONNDORFF, J.A. 1798. *Zoologische Beyträge zur XIII. Ausgabe des Linnischen Natursystems*. Dritter Band. Amphibien und Fische. Leipzig: Weidmannschen Buchhandlung, pp. 980.
- DUMÉRIL, A.M.C. AND BIBRON, G. 1835. *Erpétologie Générale ou Histoire Naturelle des Reptiles*. Tome Second. Paris: Roret, 680 pp.
- ERNST, C.H., ALTENBURG, R.G.M., AND BARBOUR, R.W. Undated. Example from species module – *Pelomedusa subrufa*. ETI – Turtles of the World. <http://www.eti.uva.nl/Turtles/Turtles3.html>. [Downloaded 18 August 2004].
- FRITZ, U. AND HAVAS, P. 2007. Checklist of chelonians of the world. *Vertebrate Zoology* 57:149-368.
- GASPERETTI, J., STIMSON, A.F., MILLER, J.D., ROSS, J.P., AND GASPERETTI, P.R. 1993. Turtles of Arabia. *Fauna of Saudi Arabia* 13:170-367.
- GERLACH, J. 2000. On the first captive breeding of the Seychelles black

- mud turtle *Pelusios subniger parietalis*. Phelsuma 8:73-75.
- GORMAN, G.C. 1973. The chromosomes of the reptilia, a cytotoxic interpretation. In: Chiarelli, A.B. and Capanna, E. (Eds.). Cytotaxonomy and Vertebrate Evolution. Academic Press, New York, pp. 349-424.
- GRAY, J.E. 1863. Notice of a new species of *Pelomedusa* from Natal. Ann. Mag. Nat. Hist. 3:99-100.
- HENKEL, F.W. AND SCHMIDT, W. 1995. Amphibien und Reptilien Madagaskars, der Maskarenen, Seychellen und Komoren. Eugen Ulmer GmbH & Co., Stuttgart, 311 pp.
- HEWITT, J. 1935. Some new forms of batrachians and reptiles from South Africa. Rec. Albany Mus. 4:283-357.
- HOFFMAN, D. AND VAN DER BANK, H. 2001. *Pelusios subniger subniger* – geographical distribution. African Herp News 32:24.
- IVERSON, J. 1992. A Revised Checklist with Distribution Maps of the Turtles of the World. Privately published, Richmond, Indiana, 363 pp.
- JACOBSEN, N.H.G. 1989. A herpetological survey of the Transvaal. Ph.D. Dissertation, University of Natal, Durban, South Africa.
- JACOBSEN, N.H.G. AND VAN DER WAAL, B.C.W. 1995. *Pelusios subniger subniger* – geographical distribution. African Herp News 23:49.
- KILLEBREW, F. 1975. Mitotic chromosomes of turtles: 1. The Pelomedusidae. Journal of Herpetology 9:281-285.
- LACÉPÈDE, B.G.E. DE. 1788. Histoire Naturelle des Quadrupèdes Ovipares et des Serpens. Tome Premier. Paris: Hôtel de Thou, 651 pp. Quarto edition.
- LOVERIDGE, A. 1941. Revision of the African terrapins of the Family Pelomedusidae. Bulletin of the Museum of Comparative Zoology Harvard 88:465-524.
- MERTENS, R. 1937. Bemerkungen über die Rassen von *Pelomedusa subrufa* (LaCépède). Zoologischer Anzeiger 117:139-142.
- PRITCHARD, P.C.H. 1979. Encyclopedia of Turtles. T.F.H. Publications, Neptune, New Jersey.
- ROCHEBRUNE, A.T. 1884. Faune de la Sénégalie. Reptiles. Paris.
- RÜPPELL, E. 1835. Neue Wirbelthiere zu der Fauna von Abyssinien gehörig. Amphibien. Frankfurt: S. Schmerber, 18 pp.
- SCHOEPPF, J.D. 1792. Historia Testudinum Iconibus Illustrata. Erlangae: Ioannis Iacobi Palm, 136 pp, [pp.1-32].
- SCHWEIGGER, A.F. 1812. Prodromus monographiae Cheloniorum. Königsb. Arch. Naturwiss. Math. 1:271-368, 406-458.
- STOCK, A.D. 1972. Karyological relationships in turtles (Reptilia: Chelonia) Canadian J. Genet. Cytol. 14:859-868.
- SUCKOW, G.A. 1798. Anfangsgründe der theoretischen und angewandten Naturgeschichte der Thiere. Dritter Theil. Von den Amphibien. Leipzig: Weidmannischen Buchhandlung, 298 pp.
- TURTLE TAXONOMY WORKING GROUP [Bickham, J.W., Iverson, J.B., Parham, J.F., Philippen, H.D., Rhodin, A.G.J., Shaffer, H.B., Spinks, P.Q., and van Dijk, P.P.J. 2007. An annotated list of modern turtle terminal taxa with comments on areas of taxonomic instability and recent change. In: Shaffer, H.B., FitzSimmons, N.N., Georges, A., and Rhodin, A.G.J. (Eds.). Defining Turtle Diversity: Proceedings of a Workshop on Genetics, Ethics, and Taxonomy of Freshwater Turtles and Tortoises. Chelonian Research Monographs No. 4, pp. 173-199.
- VAILLANT, L. AND GRANDIDIER, G. 1910. Histoire naturelle des reptiles. Première partie: crocodiles et tortues. In: Grandidier, A., and Grandidier, G. (Eds.). Histoire Physique, Naturelle et Politique de Madagascar. Vol.17. Paris: Hachette, 86 pp.

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