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Literature Cited

- GONZALEZ GONZALEZ, JUAN. 1993. Réunion Island – still a land of tortoises. *Chelonian Conservation and Biology* 1(1):51-52.
- JACOBSON, ELLIOTT R., BROWN, MARY B., SCHUMACHER, ISABELLA M., COLLINS, BOBBY R., HARRIS, RICHARD K., AND KLEIN, PAUL A. 1995. Mycoplasmosis and the desert tortoise (*Gopherus agassizii*) in Las Vegas Valley, Nevada. *Chelonian Conservation and Biology* 1(4):279-284.

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Observations on Feeding Habits of *Hydromedusa maximiliani* (Testudines: Chelidae) in Southeastern Brazil

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The feeding habits of South American freshwater turtles are poorly known, especially for the side-necked family Chelidae, which includes a large number of species in the Neotropical region. *Hydromedusa maximiliani* (Maximilian's snake-necked turtle; *cágado de pescoço comprido* and *cágado da serra* are Brazilian vernacular names; Fig. 1) has a geographic distribution limited to parts of southeastern Brazil, ranging from Espírito Santo to São Paulo states (Ernst and Barbour, 1989). This species lives in clear, shallow, rocky streams within montane rain forests (Fig. 2). Few natural history data are available. There are some brief reports on feeding habits by Yamashita (1990), Guix et al. (1992), and Moreira (1994). These data, based on a few specimens, describe the diet of *H. maximiliani* as "several insect orders and several unidentified insect larvae" or "Odonata larvae and tadpoles."

We studied the feeding habits of *H. maximiliani* in a 350 ha area of Parque Estadual de Carlos Botelho (24°00' – 24°15'S, 47°45' – 48°10'W) (Fig. 3A), São Paulo state, from June 1993 to June 1994. The turtles were hand-collected in a total of 8.0 km of ten small rocky streams (0.5 – 11 m wide; 0.05 – 0.60 m deep) (Fig. 3B) and marked by shell notching (Cagle, 1939). Stomach contents were sampled by flushing (Legler, 1977), fixed in 10% formaldehyde, preserved in

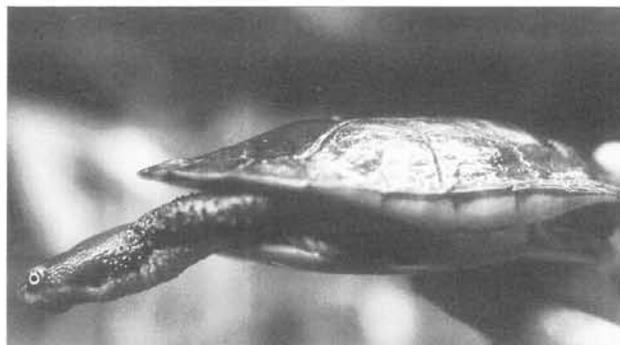


Figure 1. *Hydromedusa maximiliani* has a mean carapace length of 145 mm, and a mean weight of 365 g. The carapace has a shape similar to flat stones and the species is quite cryptic in its microhabitat. Photo by J.C. Roma.

70% ethyl alcohol, and analyzed under a stereomicroscope. Food items were sorted and identified to the lowest possible taxon. The analysis included both frequency of occurrence (percentage of individual turtles in which a given food item was found) and numeric frequency (number of individual prey of a given taxon found as a percentage of all animal food items).

The stomach contents of 113 individuals of *H. maximiliani*, including both sexes and a wide range of size classes, were examined and are listed in Table 1. This species is primarily carnivorous, consuming at least 39 prey taxa including invertebrates, vertebrates, carrion, and some plant material. The commonest prey were the small amphipod shrimp, *Hyalella pernix* (found in 35.40% of all turtles and accounting for 65.40% of all food items) and various trichopteran larvae (mainly Leptoceridae), found in 61.95% of all turtles and accounting for 13.52% of all food items. Most of the prey species were aquatic (83.30%). The presence in some individuals of typically terrestrial prey taxa, including Oligochaeta (*Fimoscolex sacii*), as well as various Araneae, Blattidae, Gryllidae, and Termitidae, also suggest opportunistic foraging. *Hydromedusa maximiliani* wanders



Figure 2. Habitat of *Hydromedusa maximiliani* in Taquaral River, Parque Estadual de Carlos Botelho. The region is characterized by hundreds of perennial and temporary shallow streams and flows with clear water and rocky bottoms (Pfeifer et al., 1986). Photo by F.L. Souza.

Table 1. Composition of stomach contents obtained from 113 *Hydromedusa maximiliani* from Parque Estadual de Carlos Botelho, São Paulo state, southeastern Brazil. Results are expressed as frequency of occurrence (percentage of turtles with the food item) and numeric frequency (percentage of the total animal matter sampled). Taxon: L = larval or nymph stages, A = adults. Habitat: T = terrestrial, A = aquatic (Borror and DeLong, 1969).

Taxon	Habitat	Occurrence	Numeric
INVERTEBRATES			
Class Oligochaeta			
Order Haplotaxida			
Fam. Glossoscolecidae			
<i>Fimoscolex sacii</i> (A)	T	1.77	0.12
Class Hirudinea sp. 1 (A)	A	0.88	0.06
Class Arachnida			
Order Araneae sp. 1 (A)	T	0.88	0.06
Class Malacostraca			
Order Decapoda			
Fam. Porcellanidae			
<i>Aegla paulensis</i> (A)	A	15.93	1.29
Order Amphipoda			
Fam. Hyalellidae			
<i>Hyalella pernix</i> (A)	A	35.40	65.64
Class Insecta			
Order Ephemeroptera			
Fam. Baetidae sp. 1 (L)			
	A	9.73	3.81
Fam. Leptophlebiidae sp. 1 (L)			
	A	13.27	1.72
Order Ephemeroptera			
Fam. Massartella sp. (L)			
	A	0.88	0.12
Fam. Euthyplociidae			
<i>Campylocia</i> sp. (L)	A	7.96	0.92
Order Odonata			
Fam. Megapodagrionidae sp. 1 (L)			
	A	0.88	0.06
Fam. Libellulidae or Gomphiidae (L)			
	A	4.42	0.37
Order Orthoptera			
Fam. Blattidae sp. 1 (A)			
	T	4.42	0.37
Fam. Gryllidae sp. 1 (A)			
	T	1.77	0.12
Order Isoptera			
Fam. Termitidae sp. 1 (A)			
	T	0.88	0.12
Order Plecoptera			
Fam. Gripopterygidae			
<i>Tupiperla</i> sp. (L)	A	1.77	0.25
Fam. Perlidae			
<i>Anacroneria</i> sp. (L)	A	0.88	0.06
<i>Kempnyia</i> sp. (L)	A	15.93	1.97
Order Hemiptera			
Fam. Belostomatidae sp. 1 (L)			
	A	1.77	0.12
Fam. Naucoridae sp. 1 (A)			
	A	0.88	0.06
Order Megaloptera			
Fam. Corydalidae			
<i>Corydalus</i> sp. (L)	A	6.19	0.43
Order Coleoptera			
Unidentified sp. 1 (A)			
	?	3.54	0.25
Unidentified sp. 2 (A)			
	?	0.88	0.06
Fam. Dysticidae sp. 1 (A)			
	A	0.88	0.06
Fam. Elmidae sp. 1 (A)			
	A	3.54	0.25
Fam. Psephenidae sp. 1 (A)			
	A	6.19	0.74
Order Trichoptera			
Unidentified sp. 1 (L)			
	A	2.65	0.18
Fam. Calamoceratidae			
<i>Phylloicus</i> sp. (L)	A	28.32	3.26
Fam. Odontoceridae			
cf. <i>Barypenthus</i> sp. (L)	A	13.27	1.72
cf. <i>Marilia</i> sp. (L)	A	4.42	0.31
Fam. Seriscotomatidae			
cf. <i>Grumicha</i> sp. (L)	A	1.77	0.25
Fam. Leptoceridae sp. 1 (L)			
	A	61.95	13.52
Fam. Glossosomatidae sp. 1 (L)			
	A	0.88	0.25
Order Lepidoptera			
Fam. cf. Pyralidae sp. 1 (L)			
	A/T	0.88	0.06
Order Diptera			
Fam. Chironomidae sp. 1 (L)			
	A	0.88	0.61
Fam. Culicidae sp. 1 (L)			
	A	4.42	0.31
Fam. Tipulidae sp. 1 (L)			
	A	0.88	0.06
VERTEBRATES			
Class Anura			
Eggs			
	A	0.88	0.18
Bones			
	A	1.77	0.12
Class Mammalia			
Order Rodentia			
Fam. Echymidae			
<i>Nelomys</i> cf. <i>nigrispinis</i> (A)	A	1.77	0.12
Plant material			
	-	13.27	-
Unidentified material			
	-	65.49	-

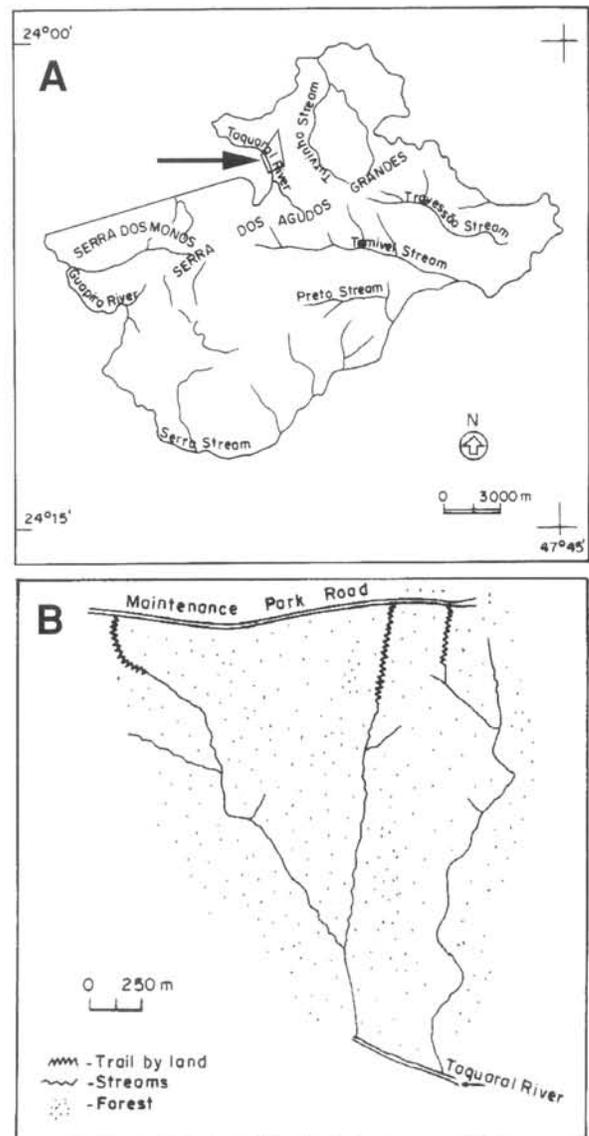


Figure 3. (A) Parque Estadual de Carlos Botelho, São Paulo, Brazil. The park encompasses 37,432 ha of Atlantic rainforest; annual rainfall is 1900 mm; mean temperature is 17.9°C. Arrow denotes the 350 ha study area (B) where ten perennial streams were surveyed for *Hydromedusa maximiliani*.

along creek bottoms while foraging and will take terrestrial prey that fall into the water. Spiders and *F. sacii*, for instance, were frequently seen floating in flooded rivers on rainy days, and some Blattidae and Gryllidae entered the water to escape army ant swarms. Plant material (found in 13.27% of all turtles) was presumably ingested accidentally during prey capture.

According to Pritchard (1984) the evolution of long necks in various chelid species is related to the capture of agile prey, including fish. Although many small fish occur in the streams inhabited by *H. maximiliani*, no fish were found in our sample. However, various invertebrate species noted here would also qualify as agile.

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Literature Cited

- BORROR, D.J., AND DeLONG, D.M. 1969. Introdução ao Estudo dos Insetos. São Paulo: Editora Edgard Blücher Ltda., 653 pp.
- CAGLE, F.R. 1939. A system of marking turtles for future identification. *Copeia* 1939:170-173.
- ERNST, C.H., AND BARBOUR, R.W. 1989. *Turtles of the World*. Washington: Smithsonian Institution Press, 313 pp.
- GUIX, J.C., MIRANDA, J.R., AND NUNES, V.S. 1992. Observaciones sobre la ecología de *Hydromedusa maximiliani*. *Bol. Asoc. Herpetol. Esp.* 3:23-25.
- LEGLER, J.M. 1977. Stomach flushing: a technique for chelonian dietary studies. *Herpetologica*. 33:281-284.
- MOREIRA, G.M. 1994. Dados preliminares do projeto de distribuição, status populacional e manejo de quelônios de água doce da Mata Atlântica do Brasil. *Chelonia Neotropica*. 1:9-11.
- PFEIFER, R.M., CARVALHO, W.A., SILVA, D.A., ROSSI, M., AND MENDICINO, L.F. 1986. Levantamento semidetalhado dos solos do Parque Estadual de Carlos Botelho, SP. *Bol. Tec. IF., São Paulo*, 40:75-109.
- PRITCHARD, P.C.H. 1984. Piscivory in turtles, and evolution of the long-necked Chelidae. *Symp. Zool. Soc. Lond.* 52:87-110.
- YAMASHITA, C. 1990. Natural history notes. *Hydromedusa maximiliani*. *Ecology. Herp. Review.* 21:19.

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The Date of Publication of Gray's *Catalogue of Shield Reptiles*

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John Edward Gray's *Catalogue of Shield Reptiles* (Gray, "1855" [1856b]) is cited by nearly all authors (e.g., Wermuth and Mertens, 1977; King and Burke, 1989; Iverson, 1992; Ernst et al., 1994) as having been published in 1855. The title page bears the date 1855, and the date of 1 December 1855 is printed at the end of the Introduction. However, Gray (1865) noted that the *Catalogue* "was printed many months before it appeared, as it had to wait to have the plates finished." Only Stejneger (1944) and Webb (1990) have cited the year of publication of the *Catalogue* as 1856, but did not discuss their reasons for doing so.

While examining the nomenclatural and taxonomic history of living trionychid turtles, I investigated the question of the date of publication of Gray's *Catalogue*. Since new names for several chelonian taxa were proposed in the *Catalogue*, the correct date of publication is unquestionably of interest. Some of these names also appear in another, concurrent chelonian taxonomic paper (Gray, "1855" [1856a]). Thus, the year and order of publication of these two references are important. This other paper was published in the *Proceedings of the Zoological Society of London* (PZS) in the December 1855 issue on pages 197-202. In this paper Gray stated (page 202) that "The new species described in this paper will be figured in the ... Catalogue ... which will shortly be published." Clearly this PZS paper (Gray, 1856a) was written before publication of the *Catalogue* (Gray, 1856b). According to Duncan (1937) the PZS paper (Gray, 1856a) was published between 22 January (pages 197-200) and 5 February (pages 201-202) 1856. Sherborn's (1934) notation of the date of publication of the *Catalogue* was 8 March 1855, but this year-date is clearly in error, especially in view of the printed date of 1 December 1855 in the Introduction to the *Catalogue*. Stejneger (1944), in his synonymy of *Trionyx argus* and *T. annulatus*, gives the date of publication of the *Catalogue* as 8 March 1856. George R. Zug (*pers. comm.*) noted that the copy of the *Catalogue* in the United States National Museum is annotated on the title page by Stejneger as follows: "rce. by Paris Academy ... in week ending March 17, 1856 (Richmond). Presented to the Trustees on 7 March 1856 and [undecipherable] the next day 8 March 1856 (Sherborn in letter to Richmond 10 June 1914)." Philip K. Tubbs, Executive Secretary, International Commission on Zoological Nomenclature (*in litt.*, 25 February 1993), also commented that "according to the records here, Gray's '1855' Shield Reptiles Catalogue was indeed issued on 8 March 1856. It should therefore be cited as Gray [1856]." The date for the publication of the *Catalogue* (Gray, 1856b) is therefore confirmed as 8 March 1856, about a month later than the publication of the PZS article (Gray, 1856a). Thus, none of the new names proposed by Gray in these two references were published in 1855. The corrected publication dates and citations of new names proposed by Gray in the two 1856 references, as determined by the present study, are listed below. Current valid taxa are marked with an asterisk (*).

Eleven new names were published first in the PZS article and should be referenced as "Gray, 1856a."

- Aromochelys* (p. 199)
- Aromochelys carinata** (p. 199)
- Chelodina colliei* (p. 200)
- Chelodina sulcata* (p. 201)
- Cuora** (p. 198)
- Cyclanosteus* (p. 201)
- Emyda ceylonensis* (p. 201)
- Kinosternon hippocrepis** (p. 198)
- Kinosternon punctatum* (p. 198)
- Macrochelys* (p. 200)
- Pseudemys** (p. 197)