congregate at high densities during the dry season (Webb and Manolis, 1983).

Brachycephalia, a gross widening and shortening of the skull, has been described in *C. porosus* (Kälin, 1936) and *C. niloticus* (Pooley, 1971). This condition has been attributed to a combination of captivity and poor diet. It was not found in live wild *C. novaeguineae*, but the skull of a large New Guinea freshwater crocodile reared in captivity did show brachycephalia.

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LITERATURE CITED

ASHFORD, R. W., AND R. MULLER. 1978. *Paratrichosoma crocodilus* (Nematoda: Trichosomoididae) from the skin of the New Guinea crocodile. J. Helminth. 52:215–220.

CHABREK, R. 1963. Methods of capturing, marking and sexing alligators. Proc. S.E. Assoc. Game and Fish Comm. 17:47–50.

COTT, H. G. 1961. Scientific results of an inquiry into the ecology and economic status of the Nile crocodile (*Crocodilus niloticus*) in Uganda and Northern Rhodesia. Trans. Zool. Soc. Lond. 29:211–337.

FERGUSON, M., AND T. JOANEN. 1982. Temperature of egg incubation determines sex in *Alligator mississippiensis*. Nature 296:850–853.

FRYE, F. L. 1981. Biomedical and surgical aspects of captive reptile husbandry. V. M. Pub. Inc., Edwardsville, Kansas. 456 pp.

GLASSMAN, A. B., T. HOLBROOK, AND C. E. BENNETT. 1979. Correlation of leech infestation and eosinophilia in alligators. J. Parasit. 65:323–324.

KÄLIN, J. A. 1936. Uber skeletonamalien der Crocodilien. A. Morphol. Oekol. Tiere 32:327–347.

KING, F. W., AND P. BRAZAITIS. 1971. Species identification of commercial crocodile skins. Zoologica 56:15–75.

LAWRENCE, W. 1977. The crocodile laws of Papua New Guinea. Wildl. Div. Publ. 77/15 Konedobu, PNG. 5 pp.

MARCUS, L. C. 1981. Veterinary biology and medicine of captive amphibians and reptiles. Lea and Fediger, Philadelphia. 239 pp.

MONTAGUE, J. J. 1980. Crocodile patrol. Paradise 21:11–14.

———. 1981. His crop is crocodiles. Intl. Wildl. 11:21–29.

———. 1983. Influence of water level, hunting pressure and habitat on crocodile distribution in the Fly River drainage, Papua New Guinea. Bio. Cons. 26:309–339.

NIE, N., C. HADLAI HULL, J. JENKINS, K. STEINBRENNER, AND D. BENT. 1975. Statistical package for the social sciences. McGraw-Hill, Inc., N.Y., N.Y. 675 pp.

POOLEY, A. C. 1971. Crocodile rearing and restocking. IUCN New Ser. Suppl. Pap. No. 32: 104–130.

SMITH, N. 1976. Leech infestations of the American alligator in Texas. Copeia 1976:842.

WEBB, G. J. W., AND S. MANOLIS. 1983. *Crocodylus johnstoni* in the McKinley River area, Northern Territory. VII. Abnormalities and injuries. Aust. Wildl. Res. 10:407–420.

———, AND H. MESSEL. 1977*a*. Abnormalities and injuries in the estuarine crocodile, *Crocodylus porosus*. Aust. Wildl. Res. 4:311–319.

———, AND ———. 1977*b*. Crocodile capture techniques. J. Wildl. Manage. 41:572–575.

WHITAKER, R. 1980. Status and distribution of crocodiles in Papua New Guinea. FAO project "Assistance to the crocodile skin industry of Papua New Guinea." Field Doc. No. 1, Konedobu, P.N.G. 59 pp.

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Prey Diversity Comparisons between Stomach and Hindgut of the Lizard, *Anolis opalinus*

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Schoener (1967) suggested that when conducting a food habits study in which prey variables are used to examine resource partitioning, one should include food items from the entire digestive tract. Schoener reasoned that large items break up in the stomach and take longer for all parts to enter the intestine than do small items. If viewing only the stomach contents, one may find recently ingested large and small items as well as parts of larger items eaten during some prior feeding period. Thus, larger prey items may be over-represented if only the stomach is examined.

We indirectly examined for this possible bias by analyzing the stomach and hindgut (large intestine) contents of 340 *Anolis opalinus* from Jamaica (for methods and other details, see Floyd and Jenssen, 1983). Using two indices, we compared the diversity of 264 possible prey taxa and eight prey size categories between the stomach and hindgut contents. The assumption was that

TABLE 1. Two diversity indices ($\bar{H}$ = Shannon and Weaver, 1949; D = Cuba, 1981) calculated for prey taxa and prey size found in the stomachs and hindguts of 340 *Anolis opalinus.*

Index	Gut location	Prey taxa	Prey size
$\bar{H}$	Stomach	4.89	0.48
	Hindgut	3.44	0.39
D	Stomach	251 + .326[1]	8 + .360[1]
	Hindgut	123 + .216	8 + .300

[1] Where D = number of categories observed (e.g., # of different prey taxa) + the distributional indicator (the actual diversity index).

on the average, the lizards had taken approximately the same kinds of arthropods during a current feeding period (stomach contents) as when they ate one to two days prior (hindgut contents) (Windell and Sarokon, 1976). Both indices showed that the diversity of prey taxa decreased by about 32% between the stomach and the hindgut, and about 18% for prey size (Table 1).

The prey taxa which were under-represented in the hindgut tended to be the soft-bodied arthropods. When food items were subjectively divided into soft- and hard-bodied, the frequency of soft-bodied prey decreased from 22% of the stomach contents to only 4% of the hindgut items (Floyd, 1982). Digestion appears to remove soft-bodied food items from the lower portion of the digestive tract.

The hindgut also contained a narrower size range of prey than the stomach, being skewed toward smaller prey lengths. This is what Schoener (1967) had predicted, but possibly for the wrong reason. The soft-bodied prey also tended to be the large food items. Therefore, we suggest that the effects of digestion may also explain the smaller diversity index values for hindgut prey size.

We cannot eliminate such explanations as small hard-bodied prey being transported more quickly from the stomach than the large soft-bodied food items. However, it seems more parsimonious that through food item removal, digestion may create a larger bias if the entire gut content is reported than any bias created by a differential rate of food passage from the stomach if only foregut contents are reported.

LITERATURE CITED

CUBA, T. R. 1981. Diversity: a two-level approach. Ecology 62:278–279.

FLOYD, H. B. 1982. Seasonal food habits of the Jamaican lizard, *Anolis opalinus* (Sauria: Iguanidae). M.S. Thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 66 pp.

———, AND T. A. JENSSEN. 1983. Food habits of the Jamaican lizard, *Anolis opalinus*: resource partitioning and seasonal effects examined. Copeia 1983:319–331.

SCHOENER, T. W. 1967. The ecological significance of sexual dimorphism in size in the lizard, *Anolis conspersus.* Science 155:474–477.

SHANNON, C. E., AND W. WEAVER. 1949. The mathematical theory of communication. University of Illinois Press, Urbana. 117 pp.

WINDELL, J. T., AND J. A. SAROKON. 1976. Rate of gastric evacuation in the lizard, *Anolis carolinensis* (Sauria: Iguanidae). Herpetologica 32:18–23.

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A New Character to Distinguish the Australian Microhylid Genera *Cophixalus* and *Sphenophryne*

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Microhylid frogs of the Australo-Papuan subfamily Sphenophryninae are currently included in six genera: *Choerophryne* Van Kampen; *Cophixalus* Boettger; *Copiula* Mehely; *Genyophryne* Boulenger; *Oreophryne* Boettger; and *Sphenophryne* Peters and Doria. These genera are either restricted to or attain their greatest diversity on the island of New Guinea, and only two genera, *Cophixalus* and *Sphenophryne,* are represented in Australia.

Cophixalus and *Sphenophryne* are distinguished by features of the pectoral girdle: *Cophixalus* lacks the clavicles and procoracoid cartilages exhibited by *Sphenophryne.* As external morphology gives no reliable guide to generic identity, field guides, e.g., Cogger (1979) and Barker and Grigg (1977), follow the key provided by Zweifel (1962), in which the first couplet requires examination of the pectoral girdle. The procedure required by this couplet is destructive: severing and reflecting the pectoral muscles from one side in order to determine the presence of clavicles and procoracoids, which are frequently small, flimsy and difficult to find. As Australian microhylid specimens are often rare and always hard-won, such destruction is undesirable.

Microhylids and many other families of frogs possess supplementary slips to the *M. intermandibularis* (Emerson, 1976): superficial muscles arising from the mandible and passing obliquely across the ventral surface of the *M. intermandibularis,* the middle of three transverse sheets of mus-