
ARTICLES

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Historical Notes on a Living Specimen of *Lanthanotus borneensis* (Squamata: Sauria: Lanthanotidae) Maintained at the Bronx Zoo from 1968 to 1976

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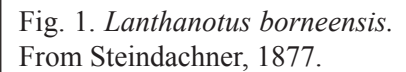
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Abstract – Until very recently, the Bornean earless monitor, *Lanthanotus borneensis*, has rarely been kept in captivity, and published accounts on the habits of captive individuals and their husbandry are scarce. In this account, we detail aspects of the husbandry and behavior of a single *L. borneensis* maintained in captivity by the Bronx Zoo from 1968 to 1976, in the hopes that this information may contribute towards an improved understanding of the species' biology and captive management.

Introduction

The Bornean earless monitor, *Lanthanotus borneensis*, remains one of the world's most enigmatic lizards (Fig. 1). Known only from Sarawak, Malaysia and West Kalimantan, Indonesia (Yaap *et al.*, 2012), Pianka (2004) estimated that only around 100 specimens of the species had ever been collected. Although several museum-based investigations have focused on its morphology and systematics (Mcdowell & Bogert,

1954; Underwood, 1957; Olivier, 1980, 1992; Maisano *et al.*, 2002), field studies have been lacking, and basic information on its natural history and occurrence remains scarce (Mertens, 1966; Proud, 1978; Harrisson, 1961; Harrisson, 1961, 1965; Harrisson & Haile, 1961; Das, 2003; Auliya, 2006; Yaap *et al.*, 2012). From limited encounters with the species in the wild, it is believed to be nocturnal (Das, 2003), and has been collected in both



Given the dearth of information available on *L. borneensis*, additional reports on specimens maintained in captivity can provide valuable information on the habits, behavior and husbandry of the species. The following article reflects on a single *L. borneensis* of unknown gender maintained by the herpetology department of the Bronx Zoo (New York, USA) between 1968 and 1976. Collected from Simunjan District, 3rd Division, Sarawak, Malaysia and gifted to the zoo by the Sarawak Museum in November 1968, few published accounts of this specimen exist, with only brief references to its longevity (Bowler, 1977) and diet (Bellairs, 1972). From archived husbandry records and miscellaneous notes, we present information pertaining to this specimen's husbandry, behavior, and growth in the hopes that it may offer some additional insight

into what is currently known about this poorly studied species. Although an earlier specimen of *L. borneensis* was received by the Bronx Zoo from the Sarawak Museum in September 1961 (Harrisson, 1961, 1962), records of this animal and its husbandry at the zoo could not be located. This specimen was purported to have survived for only a few months and was later deposited in the herpetology division of the American Museum of Natural History (AMNH R-87375, fluid-preserved).

Results and Observations

Husbandry

Housing comprised a glass terrarium measuring 76 x 30 x 38 cm (l x w x h) with the rear and side walls painted green, the front covered with cardboard, and the screen top covered with black cloth to reduce light intensity. The floor was divided into three sections consisting of an area of sand, an area of mulch, and a water basin. A rock and a log provided refuge and completed the furnishings. A heat lamp was later added in January 1969 which maintained ambient temperatures within the terrarium around 21.1° C.

Diet

The specimen accepted many different prey items including squid, pieces of flounder, sardine and anchovy, live goldfish and earthworms, but refused mussel feet, frog legs and bird eggs. Prey items were offered once to five times weekly.

Parasites

Nothing is currently known about the parasites of *L. borneensis* (Pianka, 2004). In October 1969, the specimen tested positive for hookworms (taxon not identified); however, since the animal had been in captivity for almost a year, it is unknown whether this represented a lasting wild infection or one that originated in captivity from another species in the collection.

Behavior

Unlike many of the varanid lizards kept by the Bronx Zoo at the time, the *L. borneensis* was rarely seen active, spending most of its time burrowed beneath the substrate in its enclosure or submerged in its water basin. Feeding occurred exclusively at night; therefore, observations of actual foraging and feeding behavior

were limited. When foraging, however, the lizard did employ its tongue for scent detection in a fashion similar to varanids and helodermatids. Of particular interest, husbandry records indicate that aquatic prey was occasionally swallowed while underwater, although no further details about this behavior were recorded.

Growth and Death

At the time of its acquisition, the specimen measured 38.2 cm in total length (TL) and weighed 83.5 g. The last measurements recorded prior to its death were a TL of 47 cm and mass of 209.3 g, indicating a 23% increase in body length and a 150.7% increase in mass over a period of nearly eight years. Interestingly, body mass fluctuated considerably, although gradually increasing over time.

Upon its death in September 1976, the animal was donated to the American Museum of Natural History (AMNH R-113983, fluid-preserved). Examination of this specimen by RWM in 2009 revealed that the animal was noticeably obese (Figs. 2-4), particularly in the neck region, when compared to photographs and illustrations of wild individuals (*e.g.*, Harrisson & Haile, 1961; Harrisson, 1965; Pianka, 2004; Yapp *et al.*, 2012) and recently imported wild-caught specimens observed in the pet trade. It is doubtful that this appearance is the result of fixation or preservation, especially considering that obesity is common among closely related taxa in captivity, particularly varanids and helodermatids.

Discussion

The *L. borneensis* described in this account and the specimen maintained by Robert Mertens for more than 7.5 years (Mertens, 1970a) represent the longest-living captive specimens hitherto documented for the species. Of the relatively few individuals that have been maintained in captive collections and reported on, most have fared poorly and did not live long (Harrisson, 1965; Mertens, 1964, 1966, 1971). Surprisingly, these two specimens lived for many years during a period when the biology and captive husbandry requirements of many reptiles were still poorly understood and captive lifespans were typically short.

The observed reclusiveness and cryptic nocturnal behavior of the *L. borneensis* at the Bronx Zoo is consistent with other reports on the species' activity and behavior in captivity (*e.g.*, Anonymous, 1973; Harrisson, 1961, 1962; Harrisson, 1966; Harrisson & Haile, 1961; Mertens, 1966; Proud, 1978; Shirawa & Bacchini, 2015), and corroborate previous claims that



Figs. 2-4. Former *Lanthanotus borneensis* maintained at the Bronx Zoo; now in the collection of the American Museum of Natural History (AMNH R-113983, fluid-preserved). Photographed by **Robert W. Mendyk**.

it is semi-aquatic and nocturnal in the wild (Das, 2003). Earthworms and fish appear to be regularly accepted by most captives (Mertens, 1966, 1970; Murphy, 2015; Shaw, 1963; Shirawa & Bacchini, 2015; this study).

The apparent ability of *L. borneensis* to swallow prey while fully-submerged (Shirawa & Bacchini, 2015; this study) is intriguing, as this behavior has rarely been documented in lizards (*i.e.*, *Amblyrhynchus cristatus*). While many varanid lizards, the sister group to *Lanthanotus* (Ast, 2001), are highly-adept at capturing aquatic prey, they must return to the surface or land to swallow their prey (*e.g.*, Cota & Sommerlad, 2013; Shannon & Mendyk, 2009; Shuter, 2014); a possible exception is the highly aquatic *V. mertensi*, which has been reported to swallow prey underwater (S. Sweet, pers. comm.). Investigations of the anatomical features that enable *L. borneensis* to swallow prey underwater as well as observations on its foraging and prey handling tactics in captivity can shed further light on this unusual ability.

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