

**The status of the Niah cave crab, *Adeleana chapmani*
(Decapoda, Gecarcinucidae), Sarawak, Malaysia**

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Abstract

The Niah cave crab (*Adeleana chapmani* Holthuis, 1979) was first collected in 1978, and is known only from the type locality, a small area of Niah Great Cave in Sarawak, northwestern Borneo. No further observations have been reported since that time. Because the Niah cave system is impacted by the bird's nest harvesting trade, and the guano-based ecosystems on which the crabs depend are disrupted by widespread guano digging, the survival of the crab population was in question. Fieldwork in Niah Great Cave in July 2011 confirmed a single small population, occupying an area of < 50 m². This habitat has been severely compromised by human traffic and pollution. If exploration of other caves of the region fails to reveal any other populations, the continued survival of this species is unlikely without active conservation measures.

Article

Niah Great Cave is a voluminous cave system more than 5100 m in length that is the key feature within Niah National Park, in northwestern Sarawak (Fig 1.). A recent re-survey of the cave (McFarlane and Lundberg, in prep.) mapped 11 ha of cave floor. Niah Great Cave supports a long-standing bird's nest harvesting industry that collects nests of the Black-nest Swiflet *Aerodramus maximus* (Hume), 1878 three times a year to be sold as a gastronomic delicacy. The high value of the nests (~ US\$1200/kg of freshly-collected nests in 2001²) and the complex history of the collection rights requires that the nesting sites be guarded at all times, so that the industry supports a population of nest guards living in the cave. The guards exert a significant impact on the cave ecosystem through trampling of cave floors, collection of fresh guano, and dumping garbage.

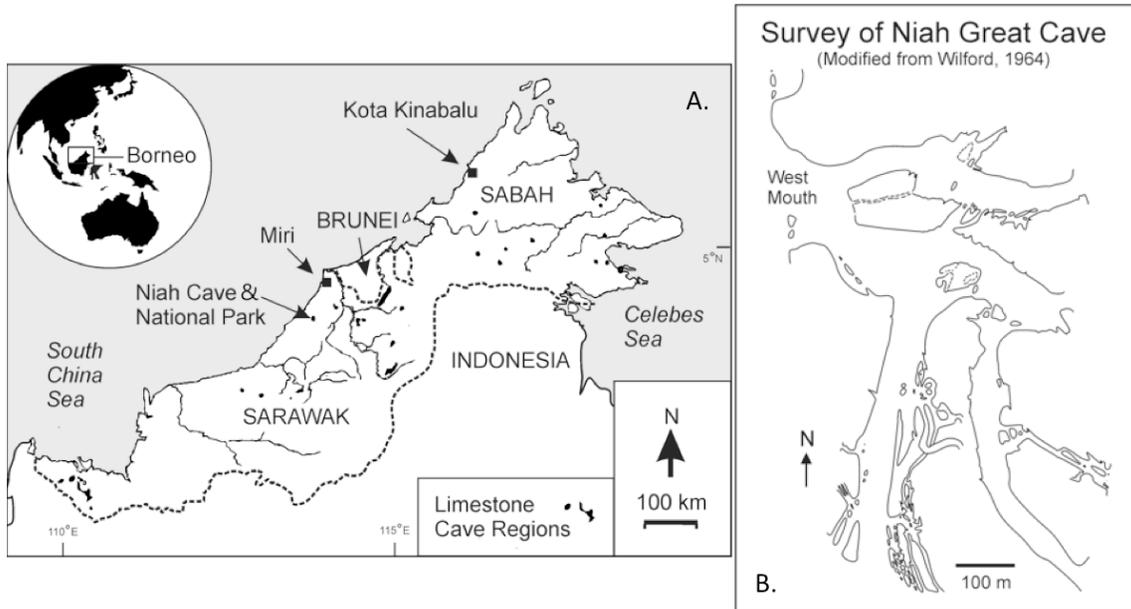


Figure 1. A) Location of Niah National Park. B) Plan, Niah Great Cave, modified from Wilford (1964)¹.

On May 22 1978, Phillip Chapman collected 4 specimens of an apparently troglitic crab from “small guano-floored pools in the dark zone” of Niah Great Cave. The precise location of these pools within the cave is no longer known (Chapman, pers. comm., 22 Nov. 2010). These specimens became the holotype (male) and paratypes (3 females) of the taxon *Adeleana chapmani* Holthuis, 1979³. Three decades of biological management has not generated any additional records of this species, either in Niah Great Cave or in other caves within Niah National Park. The species is not known to occur in the karst of Gunung Mulu National Park⁴, some 90 km distant, despite an erroneous report to the contrary⁵.

During a re-survey of Niah Great Cave undertaken in July 2011, we conducted a thorough search for *A. chapmani*. Weather conditions were dry for a period of several weeks preceding the fieldwork, so that flowing and standing water was scarce in the cave, and crab populations thus could more easily be detected in the remaining permanent water sources. We examined all sources of permanent water in the cave, finding only a single population of *A. chapmani* in ~ 160 person-hours of search time and 5100 m and ~ 11 ha of cave mapped. A minimum of seven individuals was observed. These were photographed and sketched (Fig. 2), but not collected.

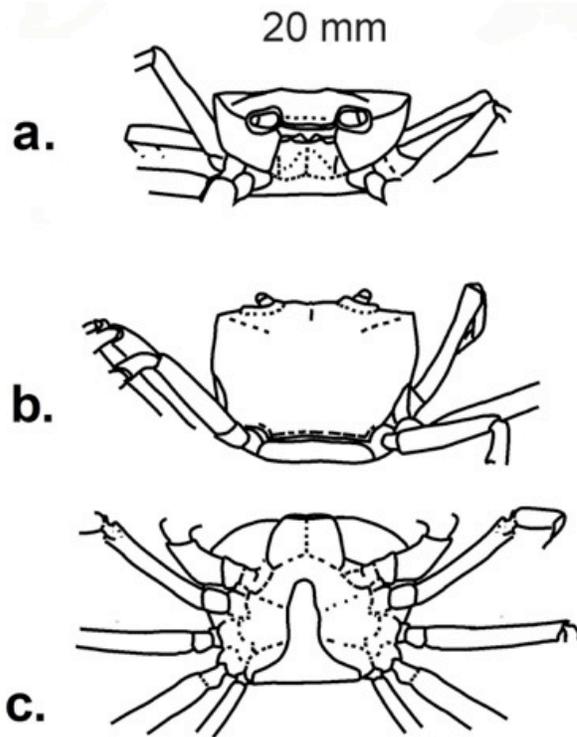


Figure 2

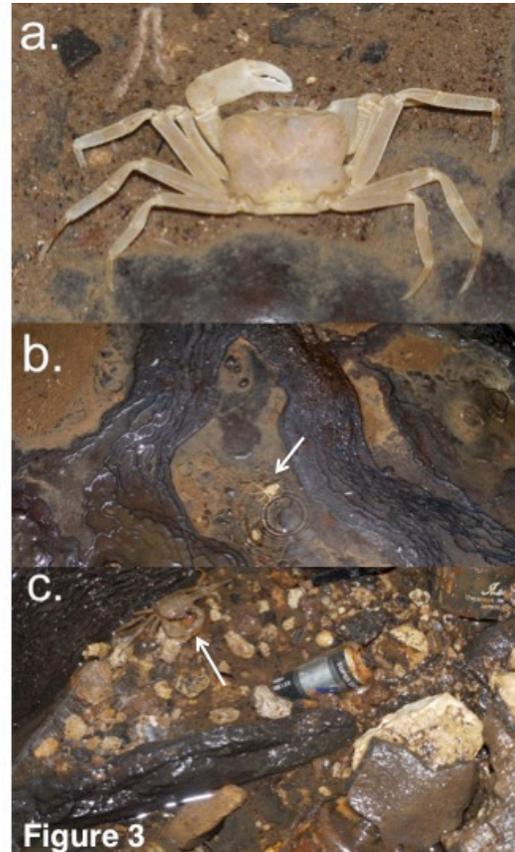


Figure 3

Figures 2 & 3. *Adeleana chapmani*, viewed from (a) anterior aspect, (b) dorsal aspect, and (c) ventral aspect. (a) Living specimen of *Adeleana chapmani*. (b) Looking vertically down on a small gour pool hosting a crab (white arrow). (c) Crab (white arrow) emerging from a pool containing rusting batteries and other garbage.

The total known distribution of *A. chapmani* consists of a single bank of stalagmitic “flowstone” gour pools, and several small drip pools immediately below and adjacent to a vertical chimney containing roosting black-nest swiftlets (Figure 3a, b, c).

The pools that comprise the habitat of *A. chapmani* are maintained by a continuous drip of meteoritic water containing bird guano. Unidentified troglotic amphipods are also visible in the pools. The total area of the habitat is approximately 50 m². The entire habitat is vulnerable to trampling by the transit of nest collectors, who have also discarded dry-cell batteries in the pools (Figure 3c). To date, these batteries appear to have been of the older, cheaper zinc-carbon type. These use a mildly acidic, ammonium chloride electrolyte that may potentially be neutralized by alkaline cave water. As nest collectors move to higher-efficiency “alkaline” batteries, which use strongly basic potassium hydroxide as the electrolyte, impacts on the aquatic invertebrate populations may become more severe.

Adeleana chapmani is distinctive because of its association with bird guano and its apparently very limited distribution. Many temperate zone troglobites exist primarily in the interstitial phreas, and only intersect cave habitat in low numbers⁶. However, this is unlikely to be the case with tropical, guanophagous species that are limited to cave habitats with continual input of fresh bird or bat guano⁷. *A. chapmani*, which has only been observed in guano-supplied cave pools (type description³; this report) lying tens of meters above the current phreatic zone, seems an unlikely candidate for a deep-phreas species. Moreover, we found that *A. chapmani* was notably absent from all other permanent water sources in Niah Great Cave (all of which are heavily impacted by the bird's nest collection industry), and from the stream passage of Lower Painted Cave, also in Niah National Park. While a thorough examination of other caves within Niah National Park and surrounding regions is warranted, the available data indicate that *A. chapmani* is a highly vulnerable species.

Adeleana chapmani is currently assessed on the IUCN Red List as a "species of least concern" based on there being "...no evidence that there is a decline in the extent and quality of its habitat which is in a protected area"⁸ This is incorrect because the IUCN assignment of *A. chapmani* to Gunung Mulu National Park is based on a published error⁹. In fact, *A. chapmani* has only been recorded from Niah National Park and it has the smallest known range of any Malaysian species, < 50 m². Although the habitat lies within Niah National Park, the political and cultural complexities of the bird's nest industry mean that much of Niah Great Cave – all of the known *A. chapmani* habitat – receives little practical protection. As a result, *A. chapmani* habitat continues to be reduced and degraded by unrestricted foot traffic and garbage dumping.

Acknowledgments

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