Varanus mabitang, A RARE MONITOR LIZARD FROM PANAY ISLAND AND A NEW CONSERVATION TARGET[1]

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ABSTRACT

Despite its huge size (minimal total length of 175 cm), the Varanus mabitang became known to science only in 2001. According to present knowledge, this blackish, arboreal lizard is confined to forested areas of NW and W Panay. It has a vegetarian diet, consisting of fruits and leaves of different forest plants. Due to the restricted range and its specialized habits, the Mabitang is a threatened species. Its protection is directly correlated to the protection of its habitat.

Introduction

Shortly after PESCP (Philippine Endemic Species Conservation Project) started its work in a previously little known lowland rainforest area on the NW Panay peninsula in 1996, initial rumors on the sighting of a huge, black, arboreal monitor lizard reached the project. So far, only the West Visayan subspecies of the water monitor, *Varanus salvator nuchalis*, was recorded for Panay (Gaulke 1991a, 1992). Because this latter varanid is relatively large (with a total length of about 150 cm), has an almost uniformly black form among its different color morphs, and is well adapted to climbing, a debate started as to whether this undescribed species really is a different species or just the black form of *V. s. nuchalis*. From the beginning, the head of project believed the claim of local hunters that two completely different varanid species, the common water monitor known as Halo, and

the rare black one known as Mabitang, exist in the area. When finally, at the end of October 2000, the first live Mabitang was brought to the project, even the skeptics among us had to admit that this was an undescribed species of varanid. Initial investigations revealed its close relation to the Philippine monitor lizard, *Varanus olivaceus*, until then believed to be unique among all other varanids, especially in its tropic ecology (e.g. Auffenberg 1988).

V. olivaceus, a large and at least partially arboreal monitor lizard, is well known for its frugivorous-molluscivorous feeding habits, an exception among varanids, as all other known species are carnivorous. It is only known from parts of the Luzon faunal region (southern Luzon, Polillo, Catanduanes Islands; Auffenberg 1988, Bennett 1999). Within its range, it is restricted to primary and secondary lowland rainforests, a highly endangered habitat throughout the Philippines. Due to its small range and its dwindling habitat, it is one of the few varanids considered threatened with extinction, and therefore listed in Appendix I of CITES (Convention on International Trade in Endangered Species), while most varanids are listed in Appendix II (Eidenmueller 1997).

As earlier mentioned, initial investigations of the external morphology (for example, form and position of the nares, dentition, morphometry) of the Mabitang revealed its close relation to this rare and endangered Philippine monitor. But a number of differences, such as shape of head and tail, finer scalation, and coloration required the description of a new species, yet forming part of a *V. olivaceus*-group. After a collection permit was acquired, a second specimen of the Mabitang was caught (the first one was released back to nature after a non-invasive investigation), and the species described as *Varanus mabitang* by Gaulke & Curio in 2001. The name "Mabitang" was chosen to acknowledge the fact that although this species was new to science, it has long been known as Mabitang to the people of the region who raised our awareness about the existence of this species.

The description was just the first step in order to anchor this remarkable varanid officially within the scientific world. But the questions which are of most concern to us as conservationists, such as its exact distribution range, population status, and ecological requirements are just beginning to be answered. Thus, the purpose of this paper is to introduce this species to a wider public, present the results of our initial surveys, and provide information about the survey and conservation programs that have been started.

Methods

From the first time that the Mabitang was mentioned to PESCP project members, all information regarding this animal was recorded, and later on, when its existence was confirmed, analyzed. Two specimens of *Varanus mabitang* have been investigated so far. While one was released unharmed after some measurements and photos were taken, the other was kept in a large enclosure for more than a week to enable the project staff to conduct observations. This specimen was designated as holotype,[2] and data on its anatomy, dentition, and gut contents became available.

One of the most urgent tasks to be tackled was a distributional survey. The population status of this almost unknown varanid can be evaluated only if the geographic range has been established. Consequently, a short-term distributional survey previous to the scientific description was conducted from February 13 to April 12, 2001.[3] More than 20 localities on Panay (spread across all four provinces), three on the Semirara Islands, and three localities on Cebu were visited. In all visited areas, local inhabitants (especially hunters or former hunters and farmers with land close to forested regions) were interviewed using a standard questionnaire. The interview was structured to enable verification of the different responses. Thus, to ascertain the reliability of information provided by respondents, a photograph of a species that does not even occur within the Philippines was purposely

included among the photos of different Philippine varanid species that were presented to interview partners at the start of the interview. Hence, information from people who claimed that all varanids in photographs were present in the area was regarded as unreliable. On the other hand, information from people who provided accurate identification and named the Mabitang correctly was considered highly valuable. The interview included questions regarding habitus, relative abundance, reproductive biology, food and feeding habits, general behavior, and habitat.

The team visited the capture site of the investigated *V. mabitang* specimens to gain first hand information on their habitat and ecology. A preliminary survey to assess the possibilities of tracking the Mabitang based on traces was conducted around Sibaliw on the NW Panay peninsula.

Results

Characteristics. *V. mabitang* is a very large varanid. The first captured specimen had a total length of 175 cm (snout-vent length 64 cm, tail length 111 cm) and weighed 5750 g. The holotype (PNM 7272), a female, is smaller, measuring 126.8 cm (snout-vent length 52.7 cm, tail length 74.1 cm) in total length and weighing 1850 g. Local inhabitants considered the first caught specimen as medium-size, suggesting that the species can grow significantly longer. As recently as February 2002, a Mabitang with an estimated girth width of 21 cm and a total length of over 200 cm was sighted by a member of the project.

V. mabitang has a relatively slender habitus. Limbs and toes are long and slender, with very long and strongly curved claws. The slender tail is triangular in cross section while the upper crest forms a prominent, longitudinal, double-keeled scale row. The head profile shows a pointed and slightly upward turned snout, a swollen nasal region, and a bulging temporal region. The narial openings are slit-like and positioned much closer to the tip of the snout than to the eye. The teeth are blunt to conical; the dentary

teeth do not extend beyond the gum but are visible only as translucent, flat ovals within the gum.

With its exceptionally fine scalation, the *V. mabitang* has consequently very high standard scale counts (e.g. 70 scales from rictus to rictus across head, 124 transverse rows of ventral scales, 138 transverse rows of dorsal scales; for more details see Gaulke & Curio 2001). Most body scales, including the ventrals, are strongly keeled while the head scales are flat and polygonal to roundish, with several distinctive pustules on each.

V. mabitang is an almost uniformly black varanid. Slight indications of yellow on neck, anterior part of dorsum, and dorsal sides of extremities are visible only from a short distance. The ventral side is anthrazite. The eyes are reddish brown, the tongue is pink, and the claws are dark grey.

An unusual anatomical feature of varanids, shared by *V. mabitang* and *V. olivaceus*, is the possession of a large caecum.

Food and feeding habits. Information on the diet of the Mabitang is scarce and somewhat confusing. Some people told us that it has exactly the same feeding habits as the Halo (a carnivorous varanid, e.g. Gaulke 1991b), while others told us that it feeds on fruits and leaves exclusively. An omnivorous diet, as is known for *V. olivaceus*, was not reported. Observations on its herbivorous diet mainly came from hunters or former hunters who have extensive knowledge of the forest and its inhabitants, and who therefore seemed more reliable. The feces of the first caught Mabitang contained *Pandanus* seeds, but other food items were not discernible. Feeding trials with the second Mabitang showed that it feeds on the ripe seeds of different *Pandanus* species and the small ripe fruits of the fig tree *Ficus minahassae*. However, it refused molluscs (various species were offered), which form an important part of the diet of *V. olivaceus*. Additional data on its tropical ecology come from isotope analyses of claw and soft tissue material of the holotype, and of known food plants. They confirm a completely, or at least almost completely, vegetarian diet for this specimen (Struck, Altenbach, Gaulke, and Glaw, unpublished data).

Distribution and population density. From the beginning it was evident that the Mabitang is sighted in forested areas or, rarely, on clearings close to the forest edge, but never, unlike the water monitor, in completely cultivated areas. The forest cover on Panay is restricted to an isolated patch on the NW Panay peninsula, and the N-S oriented expanse parallel to the West coast, covering parts of the west Panay mountain range. Only inhabitants of villages close to forested areas were able to give information about the Mabitang. Many people interviewed in the barrios on the NW Panay peninsula, especially around Luhod Bayang, easily identified the Mabitang; some even considered it as relatively common, with last sightings having occurred not too long ago. On the other hand, it was obvious from their response that people from the eastern part of Panay have never seen a Mabitang or even heard about it

the since neither the pictures nor the name meant anything to them. Even along the western side of the region its distribution seems to be rather patchy.

Results from barrios along the West Panay mountain range, however, were quite different. In most barrios visited, some of the interview partners were able to identify the Mabitang, and a larger number of people were familiar with the name "Mabitang". However, in regard to last sightings, nobody had seen or caught a Mabitang for the past years or even decades. Only close to Tibiao, in the middle of the west coast area, one person reported a Mabitang catch just a few weeks prior to our visit.

The Semirara Islands, lying offshore of the NW Panay peninsula, were visited to verify reports on the occurrence of a very large and dark monitor lizard which looks different from the water monitor found on Panay. This proved true, but in a different way than hoped for. The varanid species occurring on the Semirara Islands is *V. salvator marmoratus*, the water monitor subspecies distributed on the western and northern islands of the Philippines. This subspecies is larger and generally darker than the West Visayan form. Its previously unknown distribution on this island group confirms that even though the Semirara Islands politically belong to the Antique Province in Panay, zoogeographically they belong to Mindoro. Situated on a submarine ridge ending at Mindoro (Ferner et al. 2001), they were connected to Mindoro during the Pleistocene glaciations.

Even though it was not considered as a likely distribution area for the Mabitang from the beginning, Cebu was visited because deforestation there is extremely advanced. Every new discovery, especially one as spectacular as a large vertebrate, could significantly boost efforts to protect the few remaining forest patches. However, neither the pictures, the name, nor additional descriptions yielded any positive information.

During our surveys, we met a number of people who could not identify the Mabitang from photos, but during the discussion remembered the name "Mabitang" and the descriptions of a large,

black monitor lizard from tales of their late parents and other old folks. People who had some knowledge of the Mabitang agreed that this species has become much rarer at the present time than it used to be some decades ago. They attributed the disappearance of the Mabitang to hunting. Like *V. s. nuchalis*, *V. mabitang* is hunted for its meat. If the Mabitang is tracked down on a tree, it is either shot by the hunter or forced to come down with the use of fire. Although habitat destruction was not mentioned as a reason for its population decline, it is obviously common knowledge that the Mabitang is a forest inhabitant.

Habitat. Both animals that were investigated originate from the same area within the South Pandan forest. It is a very hilly area with primary lowland rainforest (around 250 m a.s.l.). Water is abundant in the area and the larger rivers are perennial. The forest is relatively dense with huge dipterocarps covering the upper level. Especially along the riverbanks, trees are heavily overgrown with epiphytes. Another confirmed distribution area of the Mabitang is the forest around Sibaliw (approximately 450 m a.s.l.), on the NW Panay peninsula. In 2001 a Mabitang was sighted there by project members in an area where tracks document the regular occurrence of this species. Consisting of a patchwork of primary and secondary growth interrupted by clearings, the forest around Sibaliw is more disturbed than the South Pandan forest.

Almost all interview partners agreed that the Mabitang is a mainly arboreal lizard and only seldom seen on the ground. It spends the night either on big branches in treetops, or in tree holes. At Sibaliw one specimen was sighted inside a tree hole of a dipterocarp, at a height of about 10 m. That the Mabitang can climb the dipterocarps which grow very straight and have a smooth and hard bark illustrates its well developed climbing abilities. During dry and warm weather, especially following extended rainy periods, the Mabitang is sometimes seen basking in sunny patches on the ground.

Breeding biology. Very few observations on the breeding biology of the Mabitang are available. Three different hunters remembered numbers of 6, 10, and 12 eggs, respectively, in previously dissected females. According to hunters, oviposition takes place once a year and eggs are usually deposited in tree holes.

Behavioral observations. Based on information provided by interview partners and on our own observations, *V. mabitang* shows some rather unusual behavioral characteristics. Once the animal is caught, it very quickly stops any attempts at defending itself and instead remains in a state of stupor for extended periods of time. This death-feigning behavior is very convincing. When the first large specimen was brought to the research station, both local and foreign members of the project who saw it in a state of stupor regarded the animal as dead even though it showed no indications of injuries. Although it was neither enclosed nor tethered in any way, the lizard lay completely motionless for several hours, even when measurements were taken. Only when it was brought to the forest edge and felt unobserved for some time, did it become mobile again. When 'hooked' onto a tree it rushed upward, jumped to another tree, and disappeared from sight. The other specimen, which was held in a large enclosure for some days, did not move for almost two days. When it became active again, it showed astoundingly little shyness towards people. Once while being photographed inside the cage by a member of the team, the lizard appeared undisturbed and continued to climb on a tree stem and the wire meshing of the cage. Only when the camera was very close to its face did it show slight indications of threatening behavior by coiling its tail tip a bit. Otherwise, it showed none of the typical varanid threatening and defense behaviors, such as gular extension, hissing, or tail lashing. Each time the lizard was picked up, it became motionless again, its head, extremities, and tail hanging down. Yet, anyone who has experienced handling large varanids knows that this can easily end in nasty bites and cuts from tail lashings and scratches if the handling is done incorrectly:

head, limbs, and tail have to be fixed at the same time. But this never was necessary with *V. mabitang*. Local members of the project, regard this docile behavior as typical for this species.

Traces. *V. mabitang* leaves characteristic traces on its food trees. During surveys around Sibaliw station and in the South Pandan forest, we detected several long scratches on screw palms. Though civet cats (*Paradoxurus hermaphrodites*, *Viverra tangalunga*) might visit the same food trees, their scratches are distinguishable by their size. Possessing long fingers and claws, the Mabitang's scratches are predictably and significantly longer.

Discussion

Our description regarding the external habitus of the Mabitang, based on two individuals only, was confirmed throughout the interviews. According to available information, this species is always black regardless of size, can grow significantly larger than *V. s. nuchalis*, has conspicuous reddish eyes, and extremely large front and hind feet. The large feet, with their extremely long and slender fingers and long, curved claws are obviously adaptations for the highly arboreal habits of the Mabitang. They enable a good grip around smaller limbs and safe footing on bigger stems. The second captured specimen was observed gripping around a small twig with its fifth finger opposed to the others while climbing.

The well developed caecum of the Mabitang is an indication of its herbivorous diet. In carnivores, such as most varanids, it is usually absent, but it occurs frequently in herbivores. The caecum has an important function in the microbial fermentation and degradation of cellulose (e.g. McBee & McBee 1982, Troyer 1984). Another informative feature with regard to its diet is the dentition of *V. mabitang*. Most varanids have sharp and pointed teeth, sometimes curved backwards, with a serrated hind edge (see e.g. Auffenberg 1981, Mertens 1942). These teeth are well adapted for holding mobile prey species and for tearing bits of

flesh from carrion. Blunt teeth are only reported in few varanid species, such as *V. niloticus*, *V. albigularis*, *V. olivaceus* (see e.g. Auffenberg 1988, Mertens 1942), and now the Mabitang. This type of dentition is usually considered as an adaptation for crushing molluscs or other hard-shelled animals by exerting vertical pressure. Although there is no difference in number and general shape as compared with *V. olivaceus*, the dentary teeth of both investigated *V. mabitang* are very unusual in so far that they are almost completely embedded in the gum. At first glance, this type of dentition gives the impression that the Mabitang does not possess dentary teeth at all. This would mean that the Mabitang could not possibly crush molluscs or other hard-shelled prey species without causing serious gum injuries to itself. In fact, so far we have no indications of a partly molluscivorous diet as in *V. olivaceus*.

The Mabitang is the only known varanid feeding not only on fruits but also on leaves. The leaves of screw palms and a shrub species were detected in the gastrointestinal tract of a dissected Mabitang. However, data are still very scarce. Observations on the feeding habits of juveniles would be extremely interesting. The juveniles of *V. olivaceus* have sharper and more pointed teeth than the adults (Auffenberg 1988). If this is also the case in the Mabitang, it can be assumed that at least the juveniles prey on small animals.

The present distribution range of *V. mabitang* is comparatively well established as a result of our distributional survey. However, two important questions are in urgent need of further investigation. One is the altitudinal distribution of the Mabitang. If further surveys confirm that *V. mabitang*, like *V. olivaceus* (Auffenberg 1988), is restricted to lowland rainforests, it must be considered as critically endangered. This is so because only few patches of lowland rain forests are left on Panay, and even these are not sufficiently protected from further deforestation. So far the highest altitudinal record for the Mabitang is at about 450 m a.s.l., based on a sighting close to our research station in Sibaliw. Data from high elevation areas are difficult to obtain. There

are no settlements within high altitudinal forests of the west Panay mountain range, and this varanid is too rare as to make direct sightings likely during short trips. The best method will be an investigation of the altitudinal distribution of its known food plants, and a search for its traces on and around these trees. In addition to altitudinal distribution survey, surveys on other neighboring islands of the West Visayan region which still have rainforests are needed. So far we have no strong evidence indicating the occurrence of the Mabitang outside of Panay. However, there still remains a possibility that it might be detected on one of the neighboring islands. Both surveys will be started this year.[4]

A real progress in our knowledge of the reproductive mode (sensu Wake 1999) of *V. mabitang* can only be expected in the long term. Observations on mating, egg-laying, sightings of egg clutches, and the like are extremely rare in all varanids. Dissections of specimens to determine their reproductive status, as for example in *V. olivaceus* (Auffenberg 1988), are of course out of the question for a rare animal such as the Mabitang. But in respect to the close relationship between both species, we can certainly expect similarities in their reproductive biology. Clutches with 4 to 11 eggs have been reported for *V. olivaceus*; clutch size and female size are highly correlated. Most females lay one clutch per year, but some instances of females laying two clutches in one year are known (Auffenberg 1988). Clutch size of *V. olivaceus* is small compared to other large varanids. For example, the average clutch size for *V. s. salvator*, a similar sized tropical varanid, is 13, with a range between 5 and 40 (Shine et al. 1996, Erdelen 1989), and multiple annual oviposition is the norm at least in parts of its range (Shine et al. 1996). Ovulation, mating, and oviposition in *V. olivaceus* is concentrated from the end of June to the beginning of October (Auffenberg 1988). However, as the western Panay mountain range has different climatic conditions than the distribution range of *V. olivaceus*, therefore, a different breeding season is likely.

The most remarkable behavioral trait observed is the Mabitang's tendency to become completely immobile for a

prolonged period of time if frightened. The only other varanid in which letisimulation is described is *V. exanthematicus* (Barbour 1926), but it is not reported for *V. olivaceus*. The death-feigning behavior in juvenile Mabitang might be explained as passive defense strategy especially against birds of prey which detect their victims through movements. This behavior is certainly supported by the overall dark coloration of the Mabitang which blends well with the shady environment of its arboreal habitat in rainforests. However, the reason for this behavior in adults is hard to understand. Because of their large size, they probably do not have many natural enemies. The largest predator in the Philippines is the water monitor, but as adults hunt on the ground or in water, and not on trees, it is unlikely that they will prey on the Mabitang. Besides, their main prey consists of relatively small arthropods and small vertebrates such as frogs or rodents (e.g. Gaulke 1991b, Traeholt 1994, Shine et al. 1996), and their preferred habitats are swampy coastal regions, not the rainforest (e.g. Gaulke & Reiter 2001).

Another noteworthy characteristic of *V. mabitang* is its dark, blackish underside, i.e. its virtual lack of countershading (Cott 1957). If this is an adaptive characteristic, it might suggest that the animal is less often positioned horizontally than vertically. In the latter situation light would hit the body from all sides and not particularly on the back. Only field observations could give a clue as to the possible adaptation of this characteristic pattern.

Conclusions and Prospects

All available information suggests that *V. mabitang* is threatened with extinction since it is a forest dweller and most of its distribution area is deforested. Its known distribution range is very small even if the entire western Panay mountain range is included because only a very small part of this range can be inhabited. If, like the *V. olivaceus,* it is confined to the lowland rain forest, then its distribution area is even smaller still.

Unfortunately, deforestation continues and highly specialized animals such as this varanid (with regard to its feeding biology as well as its arboreal habits) cannot adapt to cultivated areas in the same way as, for example, the generalistic water monitor. Population density in the available habitat seems to be very low as evidenced by the extremely rare sightings reported by local inhabitants. An intervening period of almost three years from the first time that this lizard was mentioned to project members to the time the first individual was actually presented to the team confirms this assumption. Although hunting success is obviously very small nowadays, hunting activities continue to exert pressure on the remaining population. Consequently, the most urgent question is which conservation measures should be taken to stabilize the *V. mabitang* population.

At present, *ex situ* breeding, in other cases a very helpful measure, cannot be seriously considered because as long as data on reproductive mode and environmental needs of the Mabitang remain unavailable, the risk is high that mortality rate in captivity will exceed breeding success. Besides, the population density is so low that it seems almost impossible to collect a potential breeding group within a reasonable time. Therefore, the extraction of single individuals over a longer time period, with the hope that partners will be found in the future, is inappropriate. Another problem is that the non-invasive sex determination in varanids is extremely unreliable (see e.g. Auliya & Erdelen 1999). Even if a breeding group can be assembled, present experience shows that continued breeding of large varanids is successful only in very few species, such as some subspecies of the water monitor (e.g. Andrews & Gaulke 1990, Wicker et al. 1999). Most of the time reproduction occurs as "accidental" success and cannot be systematically repeated. Up to now there exists no report on the successful breeding of *V. olivaceus*, the closest relative of the Mabitang, despite the fact that groups of this species have been kept in captivity since many years (e.g. Auffenberg 1988). This is due to various factors, one of them being the extremely long

incubation time of large varanids. Auffenberg (1988) concludes from sightings of *V. olivaceus* hatchlings and from the number of *times of observed egg-depositions that incubation in this species* takes from six months to one year! Obviously, the risk of fungal infections and the loss of embryos are much larger in eggs which have to be incubated for such a long time than, for example, in crocodile eggs with their significantly shorter incubation periods.

The only promising conservation measure at the moment is habitat protection supported by an anti-hunting program. One of the main distribution areas of the Mabitang lies within the action radius of PESCP whose main objective is the protection of the remaining forest patches in this area. Cooperation with the local inhabitants is immensely important, while their acceptance of and understanding regarding conservation projects continue to deepen. As a result, many former hunters have, in the meantime, become project members—a move which benefits both sides.

The "flagship" of the project is the Writhed-billed Hornbill or Dulungan (*Aceros waldeni*), a highly endangered hornbill, which only occurs on Panay and Negros. *In situ* measures such as anti-hunting campaigns and nest-incentive schemes conducted since 1995 have led to a better understanding of the uniqueness of this beautiful bird (e.g. Curio 2002, in press). As a consequence, hunting and poaching in the area have significantly decreased since then while knowledge of its natural history has increased (Curio in press).

Now the project hopes to get the same attention for the Mabitang. Included in our educational programs is raising the awareness among local inhabitants of the uniqueness of this remarkable lizard, and instilling in them a sense of responsibility for its survival. With the help of local project members, the Wildlife Conservation and Education Program and the PESCP are undertaking a project to collect more data on the natural history of the Mabitang. We hope that publicity of the lizard's plight will lead to concerted efforts and stronger commitments to provide total protection to the remaining forest areas on Panay.

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