

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA



Fourteenth meeting of the Conference of the Parties
The Hague (Netherlands), 3-15 June 2007

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

To transfer to Appendix I the population of the subspecies *Heloderma horridum charlesbogerti*, endemic to the semi-arid region of Guatemala, currently listed in Appendix II (within the populations of *Heloderma horridum*):

- a) in accordance with Resolution Conf. 9.24 (Rev. CoP13), Annex 1, criteria A i), ii) and v) owing to an observed decline in the number of individuals and in the area and quality of habitat; each subpopulation being very small; and a high vulnerability to both intrinsic and extrinsic factors.
- b) in accordance with Resolution Conf. 9.24 (Rev. CoP13), Annex 1, criteria B i), ii), iii) and iv) owing to its having a very restricted and fragmented area of distribution; and with observed decreases in its area of distribution, and habitat area and quality, as well as in the number of individuals, subpopulations and recruitment.
- c) in accordance with Resolution Conf. 9.24 (Rev. CoP13), Annex 1, criterion C ii) owing to a marked decline in the population size, inferred from habitat loss, high levels of harvesting for trade, and high vulnerability.

B. Proponent

Guatemala

C. Supporting statement

1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Squamata
- 1.3 Family: Helodermatidae
- 1.4 Genus, species or subspecies, including author and year: *Heloderma horridum charlesbogerti*
(Campbell and Vannini 1988)
- 1.5 Scientific synonyms: None.
- 1.6 Common names: English: Guatemalan beaded lizard, blue beaded lizard
French:
Spanish: escorpión, florecilla, niño dormido, heloderma

1.7 Code numbers: Does not apply as the subspecies is not included in the CITES Appendices.

2. Overview

The purpose of this proposal is to transfer the population of the subspecies *Heloderma horridum charlesbogerti*, found in the valley of the Río Motagua in Guatemala, from CITES Appendix II to Appendix I. This recently described taxon (Campbell and Vannini 1988), is endemic with an extremely restricted distribution, being found only in the few remaining wooded areas of the semi-arid parts of the valley of the Motagua in Guatemala, over an area of no more than 24,000 ha. This subspecies belongs to the family Helodermatidae, which is the only family of poisonous lizards in the world. It is at critical risk of extinction owing to rapid loss of its habitat, the taking of specimens from the wild for local and foreign collectors, and its extermination owing to the local people's fear of it, resulting from its reputation of being extremely poisonous and aggressive. It is estimated that only between 170 and 250 specimens remain in the wild. Reproduction in captivity has been highly unsuccessful (six neonates in 10 years), despite numerous attempts. *Heloderma horridum* at the species level is currently listed in Appendix II to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and is in Index 2 of the List of Endangered Species of Guatemala (CONAP 2002). Furthermore, it is in the category 'Vulnerable' and dependent on conservation measures (VUA2cd) of the Red List of IUCN – The World Conservation Union.

3. Species characteristics

3.1 Distribution

The Guatemalan beaded lizard (*Heloderma horridum charlesbogerti*) is found solely in the low mountainous parts of the valley of the Río Motagua, in Guatemala. At the present time there are only three main populations: one between the municipality of El Júcaro in the Department of El Progreso and the municipality of Cabañas in the Department de Zacapa; a second one in some few remaining wooded areas in the municipality of Zacapa, Department of Zacapa, and a final population further to the east, in the municipality of Gualán, also in the Department de Zacapa (Ariano 2003). Its historical range covered an area of around 200,000 ha within the semi-arid region of the valley of the Río Motagua (Campbell and Vannini 1988, Campbell and Lamar 1989, 2005), but currently its distribution is confined to scattered patches of woodland that in total cover an area of around 24,000 ha (Ariano 2006 a, Ariano *in prep.*).

3.2 Habitat

The typical habitat of *H. horridum charlesbogerti*, based on places where it is currently collected or has been collected in the past, includes the ecological zones of mountains with a thorny vegetation and very dry subtropical forest (*sensu* Holdridge 1967). This comprises a vertical distribution of between 300 and 950 metres above sea-level. The dominant woodland comprises a combination of *Bucida macrostachya*, manzanote (*Pereskia autumnalis*), moringa (*Moringa oleifera*), quebracho (*Licania hypoleuca*), and *Cephalocereus maxonii*. The ground cover is sparse, with a preponderance of a ground bromeliad called 'piña de coche' (*Hechtia guatemalensis*). The ground is extremely uneven (slope of 45°-60°) and sandy (Ariano 2003).

3.3 Biological characteristics

The genus *Heloderma* belongs to the family Helodermatidae. It is the only genus of the family and has two main species: *Heloderma suspectum* Cope (Gila monster) and *H. horridum* Wiegmann (beaded lizard) (Campbell and Lamar 1989). The family Helodermatidae is the only family of lizards having glands that produce poison, and a dental structure suitable for injecting it.

Heloderma horridum was described by Wiegmann (1829). The first work on subspecies of *Heloderma horridum* was published by Bogert and Martín del Campo (1956), who described three subspecies: *H. horridum horridum*, *H. h. alvarezii* and *H. h. exasperatum*. The subspecies *H. h. horridum* is found in Mexico, from Sonora to Oaxaca; *H. h. exasperatum* is found in a very restricted area, between the south of Sonora and the north of Sinaloa; *H. h. alvarezii* is found in the north of Chiapas and the depression of the Río Lagartero in Huehuetenango, in the north-

west of Guatemala. A fourth subspecies, *H. h. charlesbogerti*, was described by Campbell and Vannini (1988) and is found only in the dry valley of the Río Motagua in the north-east of Guatemala.

The species reduces its activity dramatically in the driest parts of the year, from December to June (Ariano 2003). During this period it spends the greater part of the time hidden in underground refuges that protect it from the extreme temperatures and from dehydration. Its period of activity is restricted to the months of July to November, with October being its time of greatest activity. During this period the lizards move every night to new underground refuges, covering distances of up to 1 km in a night. The reproductive period in the wild is between the middle of September and the beginning of November. *H. horridum* performs ritual male-to-male combats (Beck and Ramírez-Bautista 1991). Mating and the male-to-male combat occur from September to November (Álvarez del Toro 1982, Beck and Ramírez-Bautista 1991). The fights in September coincide with the peak period of sperm production (Beck and Ramírez-Bautista 1991). In the years in which there is sufficient food, the females lay a clutch of 4 to 8 eggs between October and December. The young are born at the beginning of the wet season in July (Beck 2005).

In captivity the periods of incubation for *H. horridum* are between 154 and 226 days at incubation temperatures between 21°C and 29°C, with the size of the clutch varying from 2 to 22 eggs, with an average of 7-9 (Perry 1996, Perry and Ivanyi 2004). According to testicular material examined from specimens killed on the roads, collected in Sonora and Jalisco, Mexico, spermatogenesis begins at the end of August and continues until the beginning of October (Beck 2004 b). Keepers at the San Diego Zoo have had the only success in bringing about reproduction in captivity of *H. h. charlesbogerti*. Four eggs hatched out of a clutch of 10, having been laid between 7 December and 17 December 2002. The incubation period was from 145 to 148 days, with an incubation temperature of 30°C (Beck 2005, Owens 2006).

This lizard feeds exclusively on birds' and reptiles' eggs, baby birds, the young of small mammals and some types of insect (Ariano 2003, Campbell and Vannini 1988, Beck and Lowe 1991). This information has been collected from faecal samples from specimens recently captured in the field.

It should be stressed that to date it has not been possible to observe the reproductive behaviour of *H. h. charlesbogerti* in the wild (Ariano 2006 a). Nor have its nests in the wild yet been found or described (Campbell and Vannini 1988, Campbell and Lamar 2005), and the first wild neonate of the species was found only very recently (Ariano *in prep.*).

3.4 Morphological characteristics

H. h. charlesbogerti differs from the other known subspecies of *H. horridum* by the presence of enlarged preanal scales in the females (Campbell and Vannini 1988, Ariano 2003), and also by having five clearly defined yellow rings on the tail. Additionally, *H. h. charlesbogerti* can be differentiated from the subspecies that is found geographically closest to it, *H. h. alvarezi*, in that the adults have a black back that is clearly marked by irregular spots, pale yellow in colour, while *H. h. alvarezi* is completely black. There are five yellow rings on the tail. Another feature distinguishing it from *H. h. alvarezi* is the presence of seven interorbital scales (scales present between the two eyes, in the upper part of the head) rather than six (Campbell and Vannini 1988, Beck 2005).

3.5 Role of the species in its ecosystem

Bogert and Martín del Campo (1956) take the view that *H. horridum* occupies a specialized niche that is not comparable to those of other species of lizards in the world. Since as a predator it specializes in preying on the nests of vertebrates (eggs and hatchlings), it is not possible for it to be present in very high densities and it has a controlling effect on the natural populations of the fauna that shares its range (Ariano 2003, Beck 2005). At the same time *H. horridum* represents a unique genetic bank, since it is probably a 'living pharmacy' owing to the compounds that have been studied in its poisonous saliva, which have pharmacological

properties relating to diabetes, Alzheimer's disease and even HIV (Ariano 2003 b, Eng *et al.* 1990, Fenard *et al.* 1999, Lewis and Garcia 2003, Lidikay and Stone 1997, Raufman *et al.* 1991).

4. Status and trends

4.1 Habitat trends

About 30 % (around 60,000 ha) of the habitat available in the region has been destroyed in order to plant crops, principally for export (Nájera 2006). At the present time only 56 % of its original habitat remains (100,206 ha), and the greatest part of this is seriously degraded (FDN 2003). However, it is important to stress that this species lives only within certain very specific plant associations, inside the region described above (Ariano 2003), and that currently its distribution is confined to scattered patches of woodland that, in total, cover an area of about 24,000 ha (Ariano 2006 a, Ariano *in prep.*). If only patches of continuous woodland covering more than 100 ha are counted, the potential habitat goes down to 17,000 ha (Ariano 2006 a). The semi-arid region of the valley of the Río Motagua is an ecoregion that is under serious threat (Dinnerstein *et al.* 1995). Furthermore, the dry forests are among the most endangered ecosystems on the planet (Janzen 1988).

4.2 Population size

Taking as a basis the criterion that each individual's territory averages 180 ha in this population (Ariano *in prep.*), that the males' territories do not overlap (Ariano *in prep.*), and that there are 1.15 males to 1 female (Johnson and Ivanyi 2001, Beck 2005), the population of *H. h. charlesbogerti* has been estimated under two scenarios. The pessimistic scenario takes account of only the habitat available consisting of patches of continuous woodland covering areas greater than 100 ha. (17,000 ha.) and the optimistic one includes the potential total habitat (24,000 ha). This estimate indicates that there are only between 176 (pessimistic scenario) and 250 specimens (optimistic scenario) in the wild (Ariano 2006 a).

4.3 Population structure

The ratio between the sexes is 1.15 males to 1 female (Johnson and Ivanyi 2001, Beck 2005). Juveniles and neonates are very rare, with no juveniles of the species (SVL < 200 mm) having been observed and documented since the species was first described in 1988, up until very recently (Ariano 2006 b). The population of the valley of the Río Motagua is very sparse (Beck 2005).

4.4 Population trends

Campbell and Lamar (1989, 2004) indicate that over recent years it has become extremely rare to observe these lizards. The members of the communities located within the range of this species indicate that in the 1980s it was common to encounter one of these lizards while walking through the woods, but that now it is very difficult to find them (Ariano 2003). There is also speculation on the possible negative impact that hurricane Mitch in November 1998 may have had on the remaining wild populations. In that year many parts of the range of the species were flooded, since it rained in three days about three times as much as normally falls in the region in a whole year (INSIVUMEH 2005). It is known that the eggs of this species are extremely sensitive to changes in humidity and temperature, which means that the excessive wetness and the flooding that occurred at that time might have led to a major loss of the clutches for that year and consequently a decline in the already sparse population of the species. However, unfortunately there are no population data prior to 1998, as the first systematic studies on the species did not begin until 2002 (Ariano 2006 a).

4.5 Geographic trends

Campbell and Vannini (1988) describe four localities where the holotype and paratypes of the species have been collected. They also indicate its presence in certain localities of the Departments of Chiquimula and Jutiapa. At the present time the species is no longer found in

those localities (Ariano 2003) and there are reports of its becoming locally extinct in areas where it was formerly known to be collected (Ariano *et al.* 2006, Campbell and Lamar 2004). Currently, the last specimens existing in the wild are confined to small and scattered patches of dry woodland remaining in the semi-arid region of the Motagua valley (Ariano 2006 a, Beck 2005). Those patches add up to a total of 24,000 ha, with most of them covering less than 100 ha and with the largest of them being 1,500 ha in size (Ariano *in prep.*).

5. Threats

The principal threats to the species are the change in land use, illegal trade in specimens for local and foreign collectors and systematic extermination by the local communities owing to their fear of its venom and the myths that have arisen around it. Another factor that may have had a negative impact on the wild populations of this species was hurricane Mitch in 1998. It is known that the eggs of the species of the genus *Heloderma* are extremely sensitive to changes in humidity and temperature and that those factors negatively affect the percentage of them that hatch. During hurricane Mitch in 1998 huge areas of the arid regions of the Motagua valley were flooded, which may have had the result that a large percentage of the clutches in that year were lost. Unfortunately there are no population studies of the species prior to that year from which to determine the actual impact of this catastrophic event on the wild populations of the species. The effects of hurricane Mitch in 1998, as well as the species' systematic extermination and harvesting from the wild to be sold to international collectors during the 1990s, may have caused the population to have entered a genetic bottleneck. Furthermore, its habitat, the dry forest, constitutes one of the currently most endangered ecosystems (Janzen 1988, Murphy and Lugo 1986).

6. Utilization and trade

6.1 National utilization

There is local demand for the species as a specimen highly prized by collectors of herpetofauna (Ariano 2006 a, Beck 2005). Ariano (2003) estimates that in the Municipality of Cabañas, Zacapa, alone, 30 specimens have been harvested in recent years, to be sold to local and foreign collections, and that around 50 specimens have been killed out of fear, during the period from 1996 to 2000 in the same locality (Ariano 2006 a). There are no data on legal trade in the species since its national status places very strict restrictions on trade in it.

6.2 Legal trade

With the recent success of attempts at reproduction in captivity, trade in *H. horridum* is increasing. Beck (2005) mentions that the Mexican subspecies *H. h. exasperatum* and *H. h. horridum* were being sold in 2004 for USD 1,200 per specimen. Buyers in Japan have paid up to USD 4,000 (Beck 2005). In the case of *H. h. charlesbogerti*, Ariano (2003) reports that specimens have been bought from the local people by local traders for around USD 50 and were then sold to collectors in other countries for up to USD 2,000, owing to the high international demand to own this rare Guatemalan species.

Currently the only legal specimens of *H. h. charlesbogerti* to be found abroad are in zoos (ISIS 2006, Perry and Ivanyi 2004). However, permitting trade in specimens of *H. h. charlesbogerti* without major restrictions might provide a way for illegal collectors to introduce illegal specimens into trade, as well as for the illegal capture of wild specimens to establish a basis for breeding. Taking into account the high market demand existing among collectors for this species (Beck 2005), it is imperative to strengthen the existing international legislation governing trade in it.

6.3 Parts and derivatives in trade

Despite the fact that there is knowledge of the various properties of the poisonous saliva of the species, this or its derivatives have not yet entered into trade, whether locally or internationally.

6.4 Illegal trade

Ariano (2003) has estimated that approximately 35 specimens of *H. h. charlesbogerti* were taken from the wild during the 1990s and shipped abroad. Of the specimens whose whereabouts are certain, there are 19 specimens of *H. h. charlesbogerti* in captivity in Guatemala (Ariano 2003) and 15 specimens in collections in the United States of America (Perry and Ivanyi 2004, ISIS 2006).

This demand for this lizard has generated intensive collection by the inhabitants of the area, with a consequent negative impact on the populations of it. Also, a large number of specimens have been systematically exterminated because they are reputed to be extremely poisonous.

6.5 Actual or potential trade impacts

One of the principal threats to the species is its harvesting from the wild to satisfy the demand from both domestic and international collectors. Ariano (2003) has estimated that approximately 35 specimens of *H. h. charlesbogerti* were taken from the wild during the 1990s to be shipped abroad. There is a great demand for this rare species among international collectors, leading them to offer sums of up to USD 2,000 per specimen (Ariano 2003, Beck 2005). Taking into account the high market demand among collectors, the low number of specimens in existence, the difficulty in breeding it, and its vulnerability, it is considered essential to prohibit trade in this species, since if this is not done, in a short time *H. h. charlesbogerti* will be just one more in the already long list of extinct species.

7. Legal instruments

7.1 National

In 1989 the Protected Areas Act (Decree 4-89) was promulgated, providing for the establishment of the National Council on Protected Areas (CONAP), whose functions include: promoting and furthering the conservation and enhancement of Guatemala's natural heritage, administering the country's protected areas, and coordinating the nation's wild flora and fauna resources and biodiversity. The law lays down rules on the reasonable use of fauna, and there are also severe penalties ranging from five to 10 years of imprisonment and fines of GTQ 10,000 to GTQ 20,000 (USD 1,250 to USD 2,500), for any person making illegal use of wild species.

There is also the Endangered Species List (LEA, Resolution No. SC/15/2006), which is a further legal instrument that assists in the protection of species of fauna in danger of extinction. The compilation of this List is one of the stipulations of the Decree already referred to. It contains the endemic species that are endangered, as well those whose harvesting is subject to regulation.

The period between the establishment of Decree 4-89 and the present time has seen growth in the culture of readiness to report persons for misdeeds, which at least causes fear in those trading illegally in wild fauna. However, the control and surveillance systems in the country need to be significantly strengthened in order to counter the growing threat of trade in species along the roadways and at the borders.

7.2 International

The genus itself was listed in CITES Appendix II in 1975, and since then collection of and international trade in it have been prohibited. However, the Guatemalan subspecies is not specifically listed under CITES.

8. Species management

8.1 Management measures

Between 7 and 9 November 2005 various national and international experts (representing 16 institutions) met, together with authorities and other stakeholders, for the purpose of drawing up the National Strategy for Conservation of the Guatemalan Beaded Lizard, *Heloderma horridum charlesbogerti* (Ariano *et al.* 2006).

Within the Strategy, there are four primary objectives to be achieved. With regard to *in situ* conservation, it is specified that by the year 2010, there will already have been implemented formal conservation mechanisms in 60 % of the potential area of distribution of the species and the advance of the limits of agriculture will have been reduced. The second objective is that by the year 2008, illegal taking for trade will have been eliminated and the killing of *H. h. charlesbogerti* out of fear or ignorance will have been reduced by 75 %. Finally, it is stipulated that by the year 2007 the programme of research into and monitoring of the species in its habitat will have been strengthened. With reference to *ex situ* conservation, the main objective is to achieve the *ex situ* reproduction of at least one pair at each of the institutions holding a legal collection of *H. h. charlesbogerti*, both in Guatemala and elsewhere, by 2009. The programme of *ex situ* reproduction, exclusively for purposes of conservation and scientific research, is about to start.

8.2 Population monitoring

At the present time the NGO Zootropic is entrusted with the systematic monitoring of the populations of this species in the wild. It has been carrying out radiotelemetry monitoring of specimens of the species since the beginning of 2004. At the same time it has undertaken the marking of specimens living in national collections, as well as wild specimens, using subcutaneous microchips, in order to have adequate surveillance of them. The scientific monitoring carried out since 2002 has produced the first indications on the biology and the critical conservation status of the species. At the same time the strategic guidelines for monitoring are included within the National Strategy for the conservation of the species (Ariano *et al.* 2006), which will be approved and implemented shortly.

8.3 Control measures

8.3.1 International

The CITES Management Authority of Guatemala is the National Council on Protected Areas (CONAP). This has implemented ongoing capacity-building programmes on the procedures for trade in wild species directed specifically to the personnel of the entities that deal with Customs controls [Directorate of the Tax Administration (SAT)] and animal quarantine [(SEPA-OIRSA)]. In addition, it remains in permanent contact with those entities, in order to provide guidance when doubts arise in specific cases.

The measures recently established in the Central American region include the production of a set of Bi-National Crossborder Operating Manuals (MOBT), containing the procedures for controlling trade in CITES wild species. These manuals contain the procedures specific to each country. Guatemala has two manuals, one with Honduras and the other with El Salvador. This will supplement the Customs support materials since this document not only contains the procedures for legal trade in CITES species, but also offers a CD for identification of the species most under pressure from trade.

8.3.2 Domestic

On the domestic front, the National Council on Protected Areas (CONAP), the CITES Management Authority, issues licences to any person that wishes to collect species of wild fauna, thereby controlling its legal removal. The control and surveillance in the area of distribution of *Heloderma horridum charlesbogerti*, in the Motagua valley (in the east of the country), is the responsibility of the Eastern Regional Directorate of CONAP,

whose main office is located in the Department of Zacapa. The personnel of this regional office, together with the Division for Protection of Nature (DIPRONA) of the National Civilian Police, carry out periodic checks along the roadways, looking for wildlife not accompanied by the documentation permitting it to be transported legally.

CONAP also receives reports from individuals or institutions (NGOs, governmental organizations) on illegal ownership of or trade in specimens of wild species, and confiscates such specimens.

In the area there are NGOs, such as for example Zootropic, that devote themselves to carrying out educational campaigns among important communities within the range of *H. h. charlesbogerti*. These education campaigns have been successful, in that people have come to value the natural heritage that they possess, knowing that this is a species that is unique in the world. However, the control and surveillance systems need to be significantly strengthened and the legal processes need to be less bureaucratic in order to apply the law effectively with respect to traffickers.

Another important activity among the control measures is the systematic marking of the specimens extant in the country, which is carried out by means of AVID microchips for insertion under the skin, placed at either of two spots: above the right scapular or between the first and second rings on the tail. A systematic record is kept of the identification numbers of these microchips, with the aim of monitoring any taking of the specimens from the wild.

8.4 Captive breeding

Captive breeding has proven very difficult with this subspecies. Keepers at the San Diego Zoo have been the only ones to achieve success in the captive breeding of *H. h. charlesbogerti*. Four eggs hatched from a clutch of 10, laid between 7 December and 17 December 2002. The incubation period was between 145 and 148 days, at an incubation temperature of 30°C. The neonates were of snout-to-vent lengths between 119 and 123 mm and weighed between 33.5 and 36.9 g (Owens 2006).

8.5 Habitat conservation

At the present time a total of 934 ha are under protection, in the categories of private nature reserves and regional municipal parks (CONAP 2006, Nájera 2006), which represents only 3 % of the extent of the present range of the species. Only 56 % (100,206 ha), for the most part highly degraded, remains of its original habitat (FDN 2003). Currently various institutions are working to have new areas declared protected in the region. One habitat conservation strategy that has been implemented is to make the major landowners aware of the importance of conserving the remaining woodland areas on their land. This has made it possible to retain the last woodland patches in which the species lives.

9. Information on similar species

There are four subspecies of *H. horridum*: *H. h. horridum*, *H. h. exasperatum*, *H. h. alvarezii* and *H. h. charlesbogerti*. The ranges of the first three overlap, being sympatric, while the population in the Motagua valley (*H. h. charlesbogerti*) is the only allopatric one, separated from the nearest population (*H. h. alvarezii*) by about 250 km of unsuitable habitat (Campbell and Vannini 1988).

H. h. charlesbogerti differs from the other known subspecies of *H. horridum* by the females having enlarged preanal scales (Campbell and Vannini 1988, Ariano 2003). In addition, *H. h. charlesbogerti* can be distinguished from the geographically closest subspecies, *H. h. alvarezii*, owing to the fact that in the adults of *H. h. charlesbogerti*, the back has a black background, clearly marked with irregular yellow spots, while the adults of *H. h. alvarezii* have a back that is completely black. In addition the tail of *H. h. charlesbogerti* is always marked with five pairs of clearly defined yellow rings, separated by black bands, which are not found in the adults of the other subspecies.

A further feature distinguishing it from *H. h. alvarezii* is the presence of seven interorbital scales (scales present between the two eyes, in the upper part of the head) instead of six (Campbell and Vannini 1988, Beck 2005).

The subspecies can be distinguished from *H. h. horridum* because the latter's back is a dark coffee colour, not a strong black as in *H. h. charlesbogerti*. Also, *H. h. horridum* has dorsal spots that are paler and smaller, distributed from the nape of the neck to the beginning of the tail, while in *H. h. charlesbogerti* such spots are fewer in number and are found only from the points where the front limbs join the body, to the tail. Furthermore, the rings on the tail of *H. h. horridum* are not as clearly defined nor as complete as in *H. h. charlesbogerti*.

H. h. charlesbogerti can be distinguished from *H. h. exasperatum* in that the latter has a supranasal scale in contact with the postnasal one, its second supralabial scale is always in contact with the nasal one, it has eight or nine interorbital scales and finally has a very complex colouration pattern on the back, in which the pale colouring is equal to or greater in extent than the dark (Campbell and Vannini 1988, Campbell and Lamar 2005).

Finally, *H. h. charlesbogerti* can be distinguished from *H. suspectum* (Gila monster) since the latter is much smaller and primarily orange in colour, and its tail is much shorter than that of *H. h. charlesbogerti*. The proportion of tail length to SVL in *H. h. charlesbogerti* is 0.70, while in *H. suspectum* it is 0.40 (Beck 2004 a, Beck 2005).

10. Consultations

Recent genetic studies have shown evidence de that *H. h. charlesbogerti* constitutes a taxon that is genetically distinct from the other subspecies of *H. horridum*. In consequence, consideration is being given to raising it to the category of species (Douglas *et al.* 2003). However, the results of the studies are currently awaiting review. **Regardless of any outcome of such review, the population of *H. h. charlesbogerti* in the Motagua valley is definitely the species with the second-highest risk of becoming extinct in Guatemala, and one of the most threatened reptile species in the world.**

11. Additional remarks

12. References

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