HEMIDACTYLUS BRASILIANUS (Amaral's Brazilian gecko) and ***CNEMIDOPHORUS OCELLIFER*** (Spix's whiptail): PREDATION. Many arthropods are predators of lizards (McCormick & Polis, 1982). However, few studies are known regarding prey-predator relationships between reptiles and arthropods within Brazilian communities (Rocha & Vrcibradic, 1998). *Hemidactylus brasilianus* (Fig. 1A) is a nocturnal gekkonid from the semi-arid Caatingas of northeastern Brazil (Vanzolini et al., 1980). *Cnemidophorus ocellifer* (Fig. 1B) is a diurnal, neotropical, teiid occurring in Argentina, Bolivia, Paraguay, and Brazil, excluding Amazonia (Vanzolini et al., 1980). Herein, we report predation of *H. brasilianus* and *C. ocellifer* by the ant *Dinoponera quadriceps* (Hymenoptera, Formicidae) in Caatinga area.

The ant genus *Dinoponera* contains species with body sizes varying from 30 to 40 mm total length (Paiva & Brandão, 1995). *Dinoponera* ants belong to the subfamily Ponerinae, ranging from humid forest soil to dry savannas, and they are described as solitary foragers with carnivorous habits (Fourcassié & Oliveira, 2002). The neurotoxic venom of the ponerine ants is injected through a gland connected to a sting in the abdomen. It is used for killing and defence. Ponerine ant prey is diverse and includes insects and other arthropods, birds and small mammals (Hermann et al., 1984; Schatz et al., 2001). *Dinoponera quadriceps* is a typical queenless ponerine, found in the semi-arid Caatingas, Cerrado and Atlantic Forest (Paiva & Brandão, 1995).

At 08:30 on 22 October 2009, during a study of lizard assemblages, we found an adult *H. brasilianus* (38 mm SVL, 24 mm tail) in Dizimeira (06°10'80"S, 36°43'38"W; datum: WGS84, elev. 751 m), municipality of Tenente Laurentino Cruz, Rio Grande do Norte, Brazil. On 10 March 2010 ca. 09:00 in the same municipality, we found a juvenile *C. ocellifer* (size not measured) in Nascimento (06°08'14"S, 36°44'81"W; datum: WGS84, elev. 680 m). These lizards had been captured together with *D. quadriceps* in a 37.5 litre bucket pitfall trap in a forest enclave. The lizards had been killed by the ants. Immediately after we took the ants out of the traps they proceeded to carry portions of the lizards bodies in their jaws, possibly in search of their nests (Fig. 2. A-B).

Figure 1. Adult specimens of *Hemidactylus brasilianus* (A, above) and *Cnemidophorus ocellifer* (B, below) from Caatinga, northeastern Brazil.

Records for Brazilian lizards as prey of arthropods include a juvenile *C. ocellifer* predated by a centipede *Scolopendra viridicornis* (Bocchiglieri & Mendonça, 2009) and an adult *Tropidurus oreadicus* eaten in a pitfall trap by a wolf spider *Lycosa erythrognatha* (Bocchiglieri & Mendonça, 2010). In addition, Sousa & Freire (2010) observed an adult *C. natalensis* predated by the ant *D. quadriceps* in a remnant of the Atlantic Forest. The findings reported here from Tenente Laurentino Cruz represent the first record of predation by *D. quadriceps* on *H. brasilianus* and *C. ocellifer.*

The *H. brasilianus* (CHBEZ 2949) was deposited in the herpetological collection of Universidade Federal do Rio Grande do Norte, Natal City. We thank the Programa PELD/CNPq - Caatinga: Estrutura e Funcionamento and the

municipal government of Tenente Laurentino Cruz for logistical support. This study was supported by doctorate and postdoctorate fellowships from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) awarded to M. Gogliath and L.B. Ribeiro, respectively, and by a research fellowship granted by CNPq to E.M.X. Freire (304077/2008-9). IBAMA issued the required permit (Permit 206/2006 and Process 02001.004294/03-15).

Figure 2. Juvenile *Cnemidophorus ocellifer* predated by *Dinoponera quadriceps* in Nascimento, Tenente Laurentino Cruz, northeastern Brazil: (A) Anterior portion of the lizard's body cut off by the ant. (B) ant carrying part of lizard's trunk with its jaws.

REFERENCES

Bocchiglieri, A. & Mendonça, A.F. (2009). *Cnemidophorus ocellifer* (whiptail lizard). Predation. *Herpetol. Rev.* **40**, 438-438.

Bocchiglieri, A. & Mendonça, A.F. (2010). *Tropidurus oreadicus* (neotropical ground lizard). Predation. *Herpetol. Rev.* **41**, 231-231.

Fourcassié, V. & Oliveira, P.S. (2002). Foraging ecology of the giant Amazonian ant *Dinoponera gigantea* (Hymenoptera, Formicidae, Ponerinae): activity schedule, diet, and spatial foraging patterns. *J. Nat. Hist.* **36**, 2211-2227.

Hermann, H.R., Blum, M.S., Wheeler, J.W., Overal, W.L., Schmidt, J.O. & Chao, J.T. (1984). Comparative anatomy and chemistry of the venom apparatus and mandibular glands in *Dinoponera grandis* (Guérin) and *Paraponera clavata* (F.) (Hymenoptera: Formicidae: Ponerinae). *Ann. Entomol. Soc. Amer.* **77**, 272-279.

McCormick, S. & Polis, G.A. (1982). Arthropods that prey on vertebrates. *Biol. Rev.* **57**, 29-58.

Paiva, R.V.S. & Brandão, C.R.F. (1995). Nests, worker population, and reproductive status of workers, in the giant queenless ponerine ant *Dinoponera roger* (Hymenoptera, Formicidae). *Ethol. Ecol. Evol.* **7**, 297-312.

Rocha, C.F.D. & Vrcibradic, D. (1998). Reptiles as predators of vertebrates and as preys in a restinga habitat of southeastern Brazil. *Ciênc. Cult.* **50**, 364-368.

Schatz, B., Suzzoni, J.P., Corbara, B. & Dejean, A. (2001). Selection and capture of prey in the African ponerine ant *Plectroctena minor* (Hymenoptera: Formicidae). *Acta Oecol.* **22**, 55-60.

Sousa, P.A.G. & Freire, E.M.X. (2010). *Coleodactylus natalensis* (NCN). Predation. *Herpetol. Rev.* **41**, 218.

Vanzolini, P.E., Ramos-Costa, A.M.M. & Vitt, L.J. (1980). *Répteis das Caatingas.* Rio de Janeiro, Brasil: Academia Brasileira de Ciências.

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OXYRHOPUS CLATHRATUS (false coral snake): DIET. Feeding and behaviour are important ecological characteristics in the natural history of snakes (Leite et al., 2009). The most common method to study prey in a given snake is examining the digestive tracts of preserved specimens in scientific collections (Shine 1988, 1989; Andrade & Silvano, 1996; Ruffato et al., 2003; Hartman & Marques, 2005; Leite et al*.,* 2009). The feeding behaviour of *Oxyrhopus* is only known from one study of the diet of *Oxyrhopus guibei*. Andrade & Silvano (1996) found an ontogentic shift in prey choice; snakes smaller than 40 cm had only lizards in their stomachs while larger snakes preyed on solely rodents. No data on ecology and natural history is available for the false coral snake *Oxyrhopus clathratus* (Bernardo, 2010). *O. clathratus* is a rare snake which occurs only in the forested areas of the Atlantic Forest in Brazil and north Argentina. Here we provide the first record on feeding behaviour of *O. clathratus*.

On 21 January 2010 a young male *O. clathratus* (360 mm SVL + 79 mm TL) was collected in a pitfall trap at the base of the Peak of Marins (22°30'29.7'' S, 45°08'55.5'' W, WGS84 Datum, 1580 m asl), Piquete, São Paulo, Brazil. This locality forms part of the Environmental Protection Area of Mantiqueira (*APA da Mantiqueira*). This region is characterised by rugged terrain with altitudes between 1200 to 2400 m asl. The climate is subtropical with average temperatures of 20°C, highs of 35°C and lows below 0°C. Annual rainfall varies between 1,250 and 1,500 mm. The area has typical vegetation of high altitude environments, with "Alto Montana" forests and "Campus de Altitude". However, habitat alteration in the region includes *Eucalyptus* plantations, deforestation for grazing cattle and construction of houses. The collection location of the *O. clathratus* was a secondary forest with *Eucalyptus*.

After an incision for tissue collection, the researchers found an adult female *Colobodactylus dalcyanus* (Gymnophthalmidae) (42 mm body length, 74 mm total length) in the snakes stomach. *Colobodactylus dalcyanus* is a rare species known only from just two localities above 1400 m elevation: *Brejo da Lapa*, Itatiaia National Park, on the Rio de Janeiro-Minas Gerais border (Vanzolini & Ramos, 1977) and Campos do Jordão in the state of São Paulo (Manzani & Sazima, 1997), both localities in the Serra da Mantiqueira in the Brazilian Atlantic Forest. This species has been assessed as Data Deficient on the IUCN Red List (Doan, 2009) and is considered "Near Threatened" in the region (Marques et al., 2009). The biology of *C. dalcyanus* is almost completely unknown but field observations suggest this species is more active at night during the dry season and occurs only in "Campus Montanus" environments. Finding both rare species together in the same area may suggest suitable habitat in the area for both species. Local efforts to keep this area preserved are essential to maintain viable populations.

The size of a juvenile male *O. clathratus* is between 195 and 500 mm and the largest male recorded for this species is 904 mm SVL (Bernardo, 2010). This record of diet agrees with the observations made by Andrade & Silvano (1996), in that juvenile *Oxyrhopus* prefer to eat lizards.

Both, *O. clathratus* (MZUSP 18030) and *C. dalcyanus* (MZUSP 100320) specimens were deposited in the herpetological collection at Museu de Zoologia da Universidade de São Paulo.

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REFERENCES

Andrade, R.O. & Silvano, R.A.M. (1996). Comportamento alimentar e dieta da "Falsa Coral" *Oxyrhopus guibei* Hoge & Romano (Colubridae). *Rev. Bras. Zool*. **13** (1), 143-150.

Bernardo, P.H. (2010). *Taxonomic Review of Oxyrhopus clathratus*. M.Sc. Thesis. Universidade Estadual Paulista - UNESP, Rio

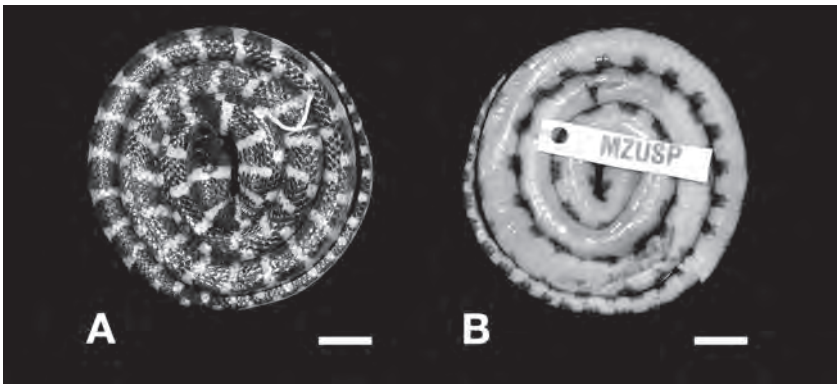

Figure 1. *Oxyrhopus clathratus* deposited specimen (MZUSP 18030).

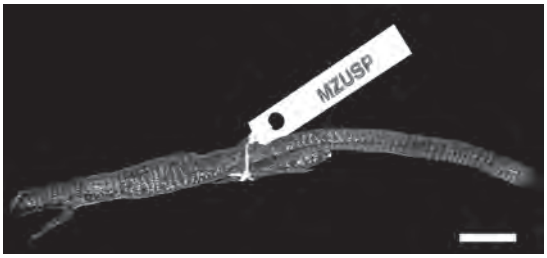

Figure 2. *Colobodactylus dalcyanus* deposited specimen (MZUSP 100320).

Claro, SP, Brazil.

Doan, T.M. (2009). *Colobodactylus dalcyanus*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. <www.iucnredlist.org>. [Accessed: 29 October 2010].

Hartmann, P.A. & Marques, O.A.V. (2005). Diet and habitat use of two sympatric species of *Philodryas* (Colubridae), in south Brazil. *Amphibia-Reptilia* **26,** 25-31.

Leite, P.T., Kaefer, I.L. & Cechin, S.Z. (2009). Diet of *Philodryas olfersii* (Colubridae) during hydroelectric dam flooding in southern Brazil. *North-Western J. Zool.* **5** (1), 53-60.

Manzani, P.R. & Sazima, I. (1997). Geographic distribution: *Colobodactylus dalcyanus*. *Herpetol. Rev.* **28**, 95-95.

Marques, O.A.V., Nogueira, C.C., Sawaya, R.J., Bérnils, R.S., Martins, M., Molina, F.B., Ferrarezzi, H., Franco, F.L. & Germano, V.J. (2009). Répteis. In: *Fauna Ameaçada de Extinção no Estado de São Paulo: Vertebrados.* Pp. 329-347.

Ruffato, R., Di-Bernardo, M. & Maschio, G.F. (2003). Dieta de *Thamnodynastes strigatus* (Serpentes, Colubridae) no sul do Brasil. *Phyllomedusa* **2** (1), 27-34.

Shine, R. (1988). Food habits and reproductive biology of small Australian snakes of the genera *Unechis* and *Suta* (Elapidae). *J. Herpetol.* **22** (3), 307-315.

Shine, R. (1989). Constraints, allometry and adaption: food habits and reproductive biology of the Australian brownsnakes (*Pseudonaja*: Elapidae). *Herpetologica* **45,** 195-207.

Vanzolini, P.E. & Ramos, A.M.M. (1979). A new species of *Colobodactylus*, with notes on the distribution of a group of stranded microteiid lizards (Sauria, Teiidae). *Pap. Avul. Zool. S. Paulo* **31**, 123-144.

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SORDELLINA PUNCTATA (water snake)**:** DIET AND BEHAVIOUR. Colubrid snakes occur in many environments worldwide. In Brazil approximately 267 have been described amounting to 75% of Brazil's serpents. In spite of such diversity many species still have little known about them. This is the case for *Sordellina punctata*, an uncommon species that is rare in scientific collections. It occurs mostly in tropical forests of southeastern Brazil (Hoge & Romano, 1978). It is not an aquatic species, but inhabits wet environments like floodplains and soak soils (Marques, 1996; Marques et al., 2001; Pereira et al., 2007). It is a diurnal, oviparous snake with seasonal reproduction. Its young are born mainly between May and June (Marques, 2001; Marques et al., 2001). There are few notes about diet of the species that note Minhocuçu (Glossoscolecidae) and other oligochaetes (Marques, 1996), and a *Gymnophiona* ingestion (Procter, 1923). The diet of young *S. punctata* is unknown.

Herein, we present feeding of *Sordellina punctata* in captivity. One young female (160 mm snout-vent length, 27 mm tail length, and 3 g), collected in Santos-SP (23º57'42.62"S, 46º19'56.15"W), was captured in Mata Atlântica, close to a stream, in March 2007. The animal was maintained at the Biological Museum of Butantan Institute, in a terrarium with a substrate of earth and coco fibre and abundant water. Food was offered to the snake weekly comprising earthworms of approximately 100 mm and 1 g.

The snake fed spontaneously on many occasions (Fig. 1) for a period of three months, consuming 12 earthworms in total. In three feedings the snake ingested more than one prey in the same day and for two occasions it ate three earthworms in succession. The weight ratio for the triple meal was 0.75 (WR = prey mass / predator mass) and for the double and single meal, 0.50. These values are high when compared to others for most colubrids, perhaps due to the type of ingested prey. It was not possible to determine the snake's hunting strategy because the food was seized as soon as it was placed in the enclosure. During rest the snake mostly remained under the coco fibre.

In the colubrids, subjugation of prey varies according to the potential capacity of a prey item to cause injury (i.e., seizing prey directly, constriction, biting/envenomation - in the case of snakes with Duvernoy glands). Snakes of small size and/or fossorial habit feed preferentially on vermiform prey, more specifically earthworms (Annelids). Such prey does not offer difficulties in capture, so energy costs are low, even though the energy gained from the meal is also low. This is most probably the case for *S. punctata* and may be the reason the serpent accepted feeding weekly.

Figure 1. Above, *S. punctata* feeding spontaneously; Below, consuming prey.

REFERENCES

Hoge, A.R. & Romano, S.A.R.W.D.L. (1978). Redescription and range of *Sordellina punctata* (Peters) (Serpentes: Colubridae). *Mem. Inst. Butantan* **40/41,** 63-70.

Marques, O.A.V. (1996). *Sordellina punctata*. Diet. *Herpetol. Rev.* **27,** 147.

Marques, O.A.V. (2001). *Sordellina punctata*. Reproduction. *Herpetol. Rev.* **32**, 51-52.

Marques, O.A.V., Eterovic, A. & Sazima, I. (2001). *Serpentes da Mata Atlântica: Guia Ilustrado para a Serra do Mar*. Holos: Ribeirão Preto. 184 pp.

Pereira, D.N., Stender-Oliveira, F., Rodrigues, M.G. & Bérnils, R.S. (2007). Distribution and habitat use of *Sordellina punctata* (Serpentes, Colubridae), with a new record from state São Paulo, Brazil. *Herpetol. Bull.* **100,** 18-22.

Procter, J.B. (1923). On a new genus and species of Colubrinae snake from SE Brazil. *Ann. Mag. Nat. Hist*. **9,** 227-230.

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HYPSILURUS MODESTUS (modest forest dragon): REPRODUCTION. *Hypsilurus modestus* occurs in Indonesia (Aru Island), New Guinea and Oceania (Bismarck, Archipelago and the Admirality Islands). In this note we provide, to our knowledge, the first information on the reproduction of *H. modestus.*

A sample of 24 *H. modestus* from Papua New Guinea consisting of 14 males (mean SVL = 78.4 mm ± 8.4 SD, range = 58-98 mm) and ten females (SVL = 82.0 mm ± 3.2 SD, range = 73-108 mm SVL) was examined from the herpetology collection of the Louisiana State University, Museum of Natural Science (LSUMZ). Lizards were collected under licence in 1999, 2004, 2006 in Sanduan Province: LSUMZ 92385-92390, 92396-92398, 92404-92409, 92416-92420; Northern Province: LSUMZ 93586; Madang Province: LSUMZ 93588, 93589; New Ireland Province: LSUMZ 94077.

The left gonad was removed for histological examination and embedded in paraffin. Enlarged ovarian follicles (> 4 mm) or oviductal eggs were counted. Histological sections were cut at 5µm using a rotary microtome and stained with Harris haematoxylin followed by eosin counterstain. Histology slides were deposited in LSUMZ.

Two stages were observed in the testicular cycle; spermiogenesis in which the lumina of the seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids, or recrudescence, in which there is a proliferation of spermatocytes to be utilized in the next period of spermiogenesis. Ten males from July all exhibited spermiogenesis. The smallest reproductively active male (spermiogenesis) measured 73 mm SVL (LSUMZ 92418). One smaller male (58 mm SVL) from June exhibited recrudescence (LSUMZ 92387) and was considered a juvenile.

Clutch size for nine females was an invariant 1.0. The presence of either one enlarged ovarian follicle (> 4 mm) or one oviductal egg with concomitant yolk deposition in a smaller follicle for a subsequent clutch (Table 1) indicated females of *H. modestus* produce multiple clutches of one egg. The smallest reproductively active female (oviductal egg and concomitant yolk deposition for subsequent clutch) measured 73 mm SVL and was from August (LSUMZ 93589).

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Month	N	Early yolk deposition	Enlarged follicle (> 4 mm)	Enlarged follicle (> 4 mm) + yolk dep.	Oviductal egg	Oviductal egg and yolk dep.
June	1	0	0	0	1	0
July	6	1	0	1	0	4
August	2	0	0	0	0	2

Table 1. Monthly stages in the ovarian cycle of *Hypsilurus modestus* from Papua New Guinea.

OXYBELIS FULGIDUS: DIET. *Oxybelis fulgidus* is a neotropical arboreal colubrid snake, that occurs from Mexico through mainland Central America south to Amazonian Bolivia and Brazil (Cisneros-Heredia & Touzet, 2007). It is also found on some islands in the region, for example; Cozumel, Mexico (Martínez-Morales & Cuarón, 1999) and Patos Island, Venezuela, but not on Trinidad & Tobago (Hayes, 2002). It is found in similar habitats as its congener *O. aeneus*, which include open areas, grassland with scrub, forest edges, clearings within forest, abandoned pastures, riparian premontane wet forest, premontane rain forests and lowland wet and dry forest (Franzen, 1996; Savage, 2002). Like *O. aeneus*, it is a diurnal forager with a similar diet that includes lizards and amphibians, arboreal mammals, small rodents and small birds. In comparison, however, birds seem to make up a larger dietary component for *O. fulgidus*, and descriptions of predation or predation attempts on birds are plentiful in the literature (Henderson, 1980). Known avian prey includes birds from the Fringillidae (Henderson, 1980), Furnariidae (Leenders & Watkins-Colwell, 2004), Bucconidae (Endo et al., 2007), Pipridae and Thraupidae (Rodrigues et al., 2005), and Tyrannidae (Rodrigues et al., 2005). Female *O. fulgidus* feed more frequently on birds than males (Scartozzoni et al., 2009).

Herein I document a predation attempt by an adult *O. fulgidus* to kill and consume an *Amazilia tzacatl* (rufous-tailed hummingbird, Trochilidae) that was caught in a 12 m wide mist net at a bird monitoring site in Tortuguero, Costa Rica. On 29 October 2010, around midday, while routinely checking a series of mist nets, I encountered an adult *O. fulgidus* in the top rung of a mist net, at approximately 2 m from the ground, trying to consume a hummingbird. The snake had most likely just killed the hummingbird, that was trapped in the mist net 80 cm from the edge. Two-thirds of the snake's body was hanging in the net while one-third remained wrapped around a nearby small tree for support (Fig. 1). The hummingbird was already dead, possibly killed by the snake's Duvernoy's gland secretion venom or by its bite, but was too entangled in the net for the snake to consume it (Fig. 1). The hummingbird, a locally common species, was aged as a hatch year individual based on a 50% score of bill striations. The snake was approximately 1.5 m in length and was released after removal from the mist net.

Figure 1. Above, hummingbird seized by *Oxybelis fulgidus,* below, hummingbird tangled in net.

A similar case of *O. fulgidus* opportunistically attempting to take a bird caught in a mist net was described from El Imposible National Park in El Salvador, where the snake pursued a larger avian prey, *Dendrocincla homochroa* (ruddy woodcreeper) (Leenders & Watkins-Colwell, 2004). I have not encountered any previous literature on vine snakes preying upon hummingbirds.

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REFERENCES

Cisneros-Heredia, D F. & Touzet, J-M. (2007). Ecuadorian distribution of snakes of the genera *Oxybelis* (Wagler, 1830) and *Xenoxybelis* (Machado, 1993). *Herpetozoa* **19** (3/4), 188-89.

Endo, W., Amend, M. & Fleck, L.C. (2007). *Oxybelis fulgidus* Prey. *Herpetol. Rev.* **38,** 209.

Franzen, M. (1996). Ökologische und morphologische aspekte einer costaricanischen population von *Oxybelis aeneus* (Wagler, 1824). *Herpetozoa* **9** (3/4), 121-131.

Hayes, F.E. (2002). Predation on birds by snakes in Trinidad and Tobago. *Living World, J. Trinidad and Tobago Field Nat. Club* **(2002)**, 59-61.

Henderson, R.W. (1980). The ecology and behavior of vine snakes (*Ahaetulla, Oxybelis, Thelotornis, Uromacer*). *Cont. Biol. Geol.* **37**, 1-38.

Leenders, T.A.A.M. & Watkins-Colwell, G.J. (2004). Notes on a collection of amphibians and reptiles from El Salvador. *Postilla* **231,** 1-31.

Martínez-Morales, M.A. & Cuarón, A.D. (1999). *Boa constrictor*, an introduced predator threatening the endemic fauna on Cozumel Island, Mexico. *Biod. and Cons.* **8**, 957-963.

Rodrigues, D.J., Lima, M.M., & Pinto, V.A.B. (2005). *Oxybelis fulgidus* (green vine snake) Diet. *Herpetol. Rev.* **36** (3), 325.

Savage, J.M. (2002). *The Amphibians and Reptiles of Costa Rica.* Chicago: Univ. Chicago Press.

Scartozzoni, R.R., Da Graça Salomão, M. & De Almeida-Santos, S.M. (2009). Natural history of the vine snake *Oxybelis fulgidus* (Serpentes, Colubridae) from Brazil. *S. Amer. J. Herpetol.* **4** (1), 81-89.

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BRACHYTARSOPHRYS FEAE (Kakhien Hills spadefoot toad): CALLING SITE. Frogs of the genus *Brachytarsophrys* are considered rare and the ecology of its five species is poorly known. *B. feae* is known from northern Vietnam, north-east Myanmar, northern Thailand (Chan-ard et al., 2007) and south-western Yunan in China, and presumed to be present in Laos (IUCN, 2006).

Observations herein were made in Tam Dao hill station in Tam Dao national park located in Vinh Phu province, northern Vietnam at 990 m asl. Between 19:30 and 22:30 six male *B. feae* were heard vocalising from small caves under rocky overhangs in a very shallow, slow moving, clear water stream. For more detail on calling sites of *B. feae* see Wogan et al. (2002). Despite similar and therefore presumably suitable habitat further downstream no other individuals could be seen or heard and thus it is likely that males of this species may form chorusing groups with strong site fidelity as reported for other Megophryd frogs (Malkmus et al., 2002). Wogan et al. (2002) recorded frogs from caves in the stream bed. In Tam Dao the frogs dug out tunnels under rocks in the sandy substrate of the stream. Tunnels measured 20-30 cm long and terminated in large chambers beneath rocks. The size of these chambers could not be ascertained as the rocks forming the roof of the chambers were too large to move. The frogs moved to the entrance of these tunnels, which were situated under rocky overhangs, to vocalise (Fig. 1), but retreated rapidly into the rock chambers as soon as they were disturbed. In some *Leptobrachium* spp. males dig submerged nesting sites under stones by digging sand away and call from them to attract females. Upon entering such a nest site females are amplexed by males and deposit eggs that are attached to the underside of the stone (Zheng & Fu, 2007; Zheng et al., 2010). Whether or not mating and subsequent egg deposition occurs in the chambers excavated by *B. feae* requires further investigation.

REFERENCES

Chan-Ard, T., Nabhitabhata, J. & Suwannapakdi, K. (2007). On the definite occurrence of *Brachytarsophrys feae* (Boulenger 1887) (Anura: Megophrydae) in Northern Thailand. *Thai. Nat. Hist. Mus. J.* **2**, 27-30.

IUCN, Conservation International and NatureServe. (2006). Global Amphibian Assessment. www.globalamphibians.org. [Accessed: November 2010].

Malkmus, R., Manthey, U., Vogel, G., Hoffman, P.

& Kosuch J. (2002). *Amphibians and Reptiles of Mount Kinabalu (North Borneo)*. Gantner Verlag: Kommanditgesellschaft, Ruggell.

Wogan, G.O.U, Lwin, K.S., Win, H., Win, H., Shein, A.K & Tun, H. (2002). The advertisement call of *Brachytarsophrys feae* (Boulenger 1887) (Anura: Megophrydae). *Proc. Calif. Acad. Sci.* **55**, 251-254.

Zheng, Y. & Fu, J. (2007). Making doughnut-shaped egg mass: oviposition behavior of *Vibrissaphora boringiae* (Anura: Megophrydae). *Amphibia-Reptilia* **28**, 309-311.

Zheng, Y., Deng, D., Li, S. & Fu, J. (2010). Aspects on the breeding biology of the Omei mustache toad (*Leptobrachium boringii*): polygamy and paternal care. *Amphibia-Reptilia* **31**, 183-194.

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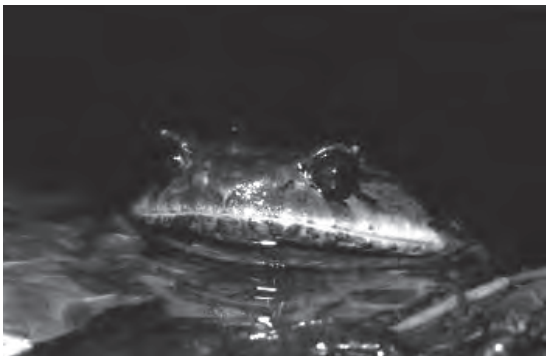

Figure 1. *Brachytarsophrys feae* in water below rocky overhang.

MEGOPHRYS NASUTA (Bornean horned frog): HABITAT AND SIZE. *Megophrys nasuta* is a large anuran with a pointed snout, triangular and pointed dermal eyelid projections, calcified skin behind the head, tympanum hidden by skin, dorsolateral groin folds, granular reddish-brown dorsum and brownish venter, webbed toes, and blunt digits (Malkmus et al., 2002; Inger, 2005). *M. nasuta* occurs from southern Thailand, Peninsular Malaysia, Singapore, Indonesia (Sumatra, Bintan Island, and Natuna Island) and Borneo (Sabah and Sarawak of Malaysia, Brunei Darussalam and Kalimantan of Indonesia) from sea level to 2,000 m (van Dijk et al., 2004; Inger, 2005, op. cit.). The species has been reported to inhabit leaf-litter of rainforests and uses streams to breed in (Inger & Stuebing, 2005; Das, 2007). It has a maximum snout-vent length (SVL) of 125 mm (Malkmus et al., 2002, op. cit.).

On 8 December 2010 at 19:29, a gravid female *M. nasuta* was found in the middle of a village road (5°59.161'N, 116°32.181'E, 1,251 m elevation), Kampung (=Village), Sokid, Bundu Tuhan, Ranau District, West Coast Division, Sabah, Bornean Malaysia. The night was drizzling, 20.6°C and 78.7% RH. The site where the individual was found was not adjacent to forest and had no stream that could be determined as natural habitat or a breeding site for *M. nasuta*. However, the village road had leaf-littered drains on both sides. This observation suggests that *M. nasuta* could be capable of adapting to different habitats than presently known. The observation also strengthens the suggestion by Kueh (2006) for equal effort to be given to research on diversity and natural history of anurans in human populated localities as well as in pristine and protected areas. Populated localities with secondary vegetative growth and forest edges may become more important habitats for anurans due to increasing shrinkage of primary forests from anthropogenic pressures. To the best of our knowledge this is the first occurrence of *M. nasuta* outside of forested habitat.

The *M. nasuta* was 134 mm SVL, 172.9 g. The individual was photographed *ex-situ* in captivity, and in the interests on conservation, was then released near the collection site, away from passing vehicles along the road. The specimen represents a new maximum size for *M. nasuta*.

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REFERENCES

Das, I. (2007). *Amphibians and Reptiles of Brunei.* Kota Kinabalu: Natural History Publications (Borneo) Sdn. Bhd. 200 pp.

Inger, R.F. (2005). *The Systematics and Zoogeography of the Amphibia of Borneo.* Kota Kinabalu: Natural History Publications (Borneo) Sdn. Bhd. 402 pp.

Inger, R.F. & Stuebing, R.B. (2005). *A Field Guide to the Frogs of Borneo 2nd Edition.* Kota Kinabalu: Natural History Publications (Borneo) Sdn. Bhd. 201 pp.

Kueh, B.H. (2006). Frogs of populated localities at West Coast and Kudat Divisions, Sabah, Malaysia: assemblage of merely commensal species or not? *J. Trop. Biol. and Cons.* **2** (1), 9-16.

Malkmus, R. Manthey, U. Vogel, G. Hoffmann, P. & Kosuch, J. (2002). *Amphibians & Reptiles of Mount Kinabalu (North Borneo)*. Ruggell: A.R.G. Gantner Verlag K.G. 424 pp.

Van Dijk, P.P. Iskandar, D. & Inger, R.F. (2004). *Megophrys nasuta.* In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. www.iucnredlist.org. [Accessed: December 2010].

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TRITURUS CRISTATUS (great crested newt): MALFORMATION. Abnormalities arise in amphibian populations as a result of genetic mutations, environmental pollutants, parasites, trauma and UV radiation damage (Blaustein & Johnson, 2003; Johnson et al., 2002; Velo-Anton et al., 2007). Amphibians seem particularly prone to polymelia (additional limbs) and polydactyly (additional digits), which may be induced by environmental retinoids or parasitic cysts (Hecker & Stanley, 2001). The latter may cause mechanical perturbation within the limb bud, which results in the growth of extra limbs/digits (Johnson et al., 1999). Other abnormalities involve alterations in body colour including masking patterns in the great crested newt *Triturus cristatus* (Sewell, 2007) and hypomelanism in the alpine newt *T. alpestris* (Gvozdik et al., 2007).

In this note I describe three abnormalities in a great crested newt population in Epping Forest, Essex, Southern England. Adult newts were captured by bottle trapping (Griffiths, 1985) twice a week in three breeding ponds as part of research into metapopulation dynamics. Over two years 573 individual great crested newts were captured and identified using belly pattern recognition (Hagström, 1973).

Three individuals exhibited forms of bidactyly (a mutation rate of 0.5%). In all cases bidactyly occurred in toes on the front feet. One individual had three toes on the left side and five on the other (Fig. 1). These mutations did not seem to affect behaviour as the newts appeared to swim and crawl effectively.

A second abnormality occurred in an adult female (SVL 75 mm), which had a partially absent lower jaw (Fig. 2). With the mouth closed, there was a gap of 5 mm between the end of the lower jaw and end of the snout. Thickened tissue around the end of the lower jaw suggests that this may have been the result of an injury that had healed. How such an injury would be sustained is unknown but a possibility could be damaging the mouth whilst attempting to feed. The newt's ability to feed seems to have been affected as it weighed 5.13 g whereas most breeding females in this population were heavier than 7.0 g (pers. obs.). In addition the bones were prominent under the skin and the newt was lethargic. It was caught by hand at the pond edge and made no attempt to swim away.

The final abnormality was observed in an adult male, which was encountered under a terrestrial refuge. The lower spine appeared fused and the rear legs did not function properly; the newt dragged the lower half of the body along using the front legs. This abnormality greatly affected the locomotor ability of the individual on land. It was

underweight (2.75 g), only slightly above the average weight of a healthy one-year-old juvenile (pers. obs.). It seems probable that this was a genetic mutation, which may have been present since birth. It is unknown how long the individual had managed to survive but it was encountered for several months under the same refuge.

Figure 1. Great crested newt with three toes on left fore foot and five on the right.

Figure 2. Female great crested newt with malformed lower jaw.

Overall, abnormalities were rare in the population with an incidence of below 1%; mutation rates normally range from 1 to 5% (Blaustein & Johnson, 2003), which indicates that these abnormalities are probably not unusual. Such occurrences were probably noticed only due to the intensive nature of this study and the relatively large number of individuals captured. It demonstrates that great crested newts suffer from several types of abnormality, caused by a variety of factors.

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REFERENCES

Blaustein, A.R. & Johnson, P.T.J. (2003). The complexity of deformed amphibians. *Frontiers in Ecology and the Environment.* **1**, 87-94.

Griffiths, R.A. (1985). A simple funnel trap for studying newt populations and an evaluation of trap behaviour in smooth and palmate newts, *Triturus vulgaris* and *T. helveticus*. *Herpetol. J.* **1**, 5-10.

Gvozdik, L., Stelskal, D. & Dvoøák, J. (2007). *Triturus alpestris* (Alpine newt): hypomelanism. *Brit. Herp. Soc. Bull.* **100**, 33-34.

Hagström, T. (1973). Identification of newt specimens (Urodela: *Triturus*) by recording the belly pattern and a description of photographic equipment for such registration. *Brit. J. Herpetol.* **4**, 321-326.

Hecker, L. & Stanley, K. (2001). Developmental analysis of limb deformities in amphibians. *Bios*. **72**, 9-13.

Johnson P.T.J, Lunde K.B., Ritchie E.G. & Launer A.E. (1999). The effect of trematode infection on amphibian limb development and survivorship. *Science* **284**, 802-804.

Johnson, P.T.J., Lande, K.B., Thurman, E.M., Ritchie, E.G., Wrag, S.N., Sutherland, D.R. Kupfer, J.M., Frest, T.J., Bowerman, J., & Blaustein, A.R. (2002). Parasite (*Ribeiroiaondratae*) infection linked to amphibian malformations in the western United States. *Ecol. Mono.* **72**, 151-168.

Sewell, D. (2007). The masked newt: variation of body coloration in a great crested newt, *Triturus cristatus*. *Brit. Herp. Soc. Bull.* **102**, 32-33.

Velo-Antón, G., Buckley, D., Daoudi, A.D. & Rivera, A.C. (2007). Bicephaly in *Salamandra salamandra* larvae. *Brit. Herp. Soc. Bull.* **101**, 31-33.

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