

(MacKinnon *et al.*, 1996). The potential 15 million year isolation of the Belantikan population from those of the Melawi basin has possible implications for the status of *B. kalimantanensis* in central Kalimantan. Further surveys to obtain specimens for systematic and ecological information (almost nothing is known of the habits of this species) are thus extremely desirable. Unfortunately, the Belantikan area has been designated a logging concession by the Indonesian government. Biodiversity surveys by organisations such as Yayasan (Orang utan Foundation Indonesia) can provide information on the presence of endangered and little-known species such as *B. kalimantanensis* that can be useful in conservation-related decisions. In this way it is hoped the Belantikan area will become a protected ecosystem in the future.

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REFERENCES

- Inger, R. F. & Stuebing, R. B. (2005). *A Field Guide to the Frogs of Borneo*. 2nd edn. Kota Kinabalu, Sabah, Malaysia: Natural History Publications.
- Iskandar, D. T. (1978). A new species of *Barbourula*: first record of a discoglossid anuran in Borneo. *Copeia* **1978**, 564–566.
- Iskandar, D. T. (1995). Note on the second specimen of *Barbourula kalimantanensis* (Amphibia: Anura: Discoglossidae). *Raffles Bull. Zool.* **43**, 309–311.
- MacKinnon, K., Hatta, G., Halim, H., & Mangalik, A. (1996). *The Ecology of Kalimantan*. Oxford, U.K.: Oxford University Press.

Recent observations of the Montserrat galliwasp, *Diploglossus montisserrati*

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THE Montserrat galliwasp *Diploglossus montisserrati* (Underwood, 1964) is a large skink-like lizard, endemic to the island of Montserrat, and the only representative of the Anguidae in the Lesser Antilles (Malhotra & Thorpe, 1999). It is considered critically endangered (Day, 1996) and extremely rare because it is only known from a single locality, and until recently had not been observed since the original specimen was collected (Censky &

Kaiser, 1999). Due to the absence of sightings of the species, and the catastrophic impact of a volcanic eruption during the mid 1990s on the extent and quality of its forest habitat, the galliwasp was considered potentially extinct. However, on August 28th 1998, a specimen was opportunistically found in an area known as Woodlands Springs (62.2156E, 16.7269N) (P. Murrain and K. Buley, pers. comm.). This site lies on the western flank of the Centre Hills, a 12 km²

forested area in the centre of Montserrat. Another galliwasp was seen at the same site in 2004 (R. Allcorn, *pers. comm.*) and three unconfirmed observations by local residents have been subsequently reported (L. Martin, *pers. comm.*). The concentration of sightings at one locality suggests the range of the Montserrat galliwasp is highly restricted. However, over the past few years search effort at this site has probably been disproportionately high compared with other Centre Hills sites. Because the Montserrat galliwasp is considered nocturnal and semi-fossorial, and has cryptic colouration, it is therefore possible that the species is more widespread and common than assumed.

In June–July 2005 and January–March 2006, a reptile and amphibian survey of the Centre Hills forest was conducted as part of a biodiversity assessment of this area. Line transects were walked at night and day at 30 sample points, distributed randomly throughout the Centre Hills forest. These surveys included intensive searching through leaf litter and refugia. In total, approximately 390 man hours of nocturnal fieldwork was conducted. On 26th January (19:15 hr), during a search of the Woodland Springs area, an adult Montserrat galliwasp was observed, confirming the continued existence of the species (Figure 1). Woodlands Springs is approximately 10 hectares of moist forest interspersed with a small number of houses, large gardens and agricultural plantations, and thus people and domestic animals, including cats and dogs, are present in the area. Topography is steep and rocky (approximately 240 metres asl), and recorded annual rainfall is roughly 1500 mm. The galliwasp was found under a stone and caught by hand, examined briefly, then measured and weighed. It had a snout-vent length of 18 cm, a tail length of 23 cm, and was 170 g in weight.

A second adult galliwasp was seen in Woodlands Springs on 5th February (18:30 hr), approximately 20–30 m from the location where the first individual was found (Figure 2). The animal was found within the roots of a tree with only its head visible but immediately retreated out of sight into the root system. It was observed again shortly afterwards and was followed for

approximately 20 minutes walking across the forest floor in an attempt to examine its behaviour and to identify potential cues to aid its detection. The galliwasp appeared to be very sensitive to disturbance and would cease moving in response to any movement or noise made by the observer. Another sighting of what was presumed to be the same individual was made in exactly the same location on the 8th March (18:00 hr).

The reptile and amphibian survey covered the whole Centre Hills and the Montserrat Forestry Department have conducted regular nocturnal fieldwork throughout the area since 1998. However, the Montserrat galliwasp has only ever been recorded in one site. This lends weight to the hypothesis that the galliwasp has a highly restricted distribution and is therefore likely to be extremely rare. As Woodlands Springs does not appear to be markedly different in terms of topography, climate and habitat structure to other nearby forest areas, it is not clear why the galliwasp would be restricted to such a small site.

Data on the ecology and natural history of the Montserrat galliwasp are sparse. As a first priority, quantitative information on distribution and population abundance is required to evaluate its status and inform conservation action. An effective and systematic survey technique needs to be developed and tested. Although the species is detectable by sight (and the noise of them moving through leaf litter provides a cue to their presence), the cryptic nature of the galliwasp and their apparent sensitivity to human presence will result in low encounter rates, thus precluding meaningful sample sizes. Pit fall trapping has been used in surveys of other galliwasp species, e.g. *Celestus cruscus* and *C. duquesneyi* in Jamaica (Wilson & Vogel, 2000), but in the current field site, such capture methods may be problematic because of the presence of rats (*Rattus rattus* and *R. norvegicus*) and domestic cats and dogs, which may predate upon any trapped animals.

A conservation action plan for the Montserrat galliwasp needs to be implemented, including a programme of field research, habitat protection and potentially invasive mammal control. Rats are common in the Centre Hills and may strongly limit population growth of galliwasp and an



Figure 1 (above). The Montserrat galliwasp, *Diploglossus montisserrati*, observed on the 26th January 2006 in the Woodlands Springs area of Montserrat.

Figure 2 (below). *Diploglossus montisserrati* observed on the 5th February 2006 in the Woodlands Springs area of Montserrat.

experiment to quantify their impact is likely to prove informative. A management plan for the conservation of the Centre Hills forest and its biodiversity is currently being developed, with the ultimate aim of establishing Montserrat's first national park, which may provide Woodlands Spring protection from further development. However, given the probable vulnerability of the

Montserrat galliwasp direct intervention to save the species, such as captive breeding, may be necessary. The observations reported here provide evidence of the continued existence of the Montserrat galliwasp which we hope will help secure the funding to facilitate the field research and conservation action that is urgently needed to ensure the long term survival of this species.

REFERENCES

- Censky, E.J. & Kaiser, H. (1999). The Lesser Antillean Fauna. In: *Caribbean Amphibians and Reptiles*. Crother, B. I. (Ed.). San Diego: Academic Press.
- Day, M. (1996). *Diploglossus montisserrati*. In: IUCN 2006. *2006 IUCN Red List of Threatened Species*. <www.iucnredlist.org>. Downloaded 10th May 2006.
- Malhotra, A. & Thorpe, R.S. (1999). *Reptiles and Amphibians of the Eastern Caribbean*. London: Macmillan Education Ltd.
- Underwood, G. (1964). An anguid lizard from the Leeward Islands. *Breviora* **200**, 1–10.
- Wilson, B.S. & Vogel, P. (2000). A survey of the herpetofauna of the Hellshire Hills, Jamaica, including the rediscovery of the Blue-tailed galliwasp (*Celestus duquesneyi* Grant). *Caribb. J. Sci.* **36**, 244–249.