# OVIPOSITION OF *STENORRHINA DEGENHARDTI* (SERPENTES: COLUBRIDAE) IN A NEST OF *ACROMYRMEX OCTOSPINOSUS* (HYMENOPTERA: FORMICIDAE)

## OVIPOSICIÓN DE *STENORRHINA DEGENHARDTI* (SERPENTES: COLUBRIDAE) EN UN NIDO DE *ACROMYRMEX OCTOSPINOSUS* (HYMENOPTERA: FORMICIDAE)

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**Abstract**

During excavation of a leaf-cutter nest (*Acromyrmex octospinosus*), we discovered a clutch laid by the colubrid snake *Stenorrhina degenhardti*. The eggs and the bulk of the ant nest were transferred to a laboratory at the University of Antioquia for rearing. The ants not only tolerated the snake clutch within their growth chamber, but the workers also actively used the eggs as structures to support symbiotic fungal growth. The lack of aggression to both the ovipositing female (presumably) and emerging neonates suggests that this association may represent more than a merely commensal association and deserves further study.

*Key words: Acromyrmex octospinosus,* ant-snake incubatory inquilinism, Formicidae, *Stenorrhina degenhardti*

**Resumen**

Durante la excavación de un nido de la hormiga cortadora *Acromyrmex octospinosus*, descubrimos una nidada de la serpiente *Stenorrhina degenhardti* de la familia Colubridae. Tanto los huevos como la masa del nido de hormiga fueron transferidos al laboratorio de la Universidad de Antioquia para ser mantenidos en cautiverio. Las hormigas no solo toleraron el nido de la serpiente dentro de la cámara de crecimiento, sino que activamente usaron los huevos como estructuras de soporte para el crecimiento del hongo simbionte. La ausencia de agresión hacia la hembra ovipositora (presumiblemente) y hacia los neonatos emergentes, sugiere que ésta asociación puede representar más que una asociación de comensalismo y amerita estudios futuros.

*Palabras claves: Acromyrmex octospinosus,* Formicidae, inquilinismo de incubación hormiga-serpiente, *Stenorrhina degenhardti*

## INTRODUCTION

Nests of leaf-cutter ants (*Acromyrmex* and *Atta)* are architecturally complex, with specialized internal designs allowing for maintenance of stable physical and environmental conditions required by the fungal gardens, queen, eggs and larva. Nest structure also may help protect the colony from predators, pathogens, and other kinds of intruders (Moreira, 2000; Weber, 1956, 1972a, b). In addition, ants actively regulate the nest microhabitat to facilitate growth of their obligate symbiotic fungi (Agaricaceae; Quinlan and Charret, 1978; Weber, 1972a). At any given time, the majority of ants

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in a colony are involved in caring for the fungi by either ridding the gardens of contaminants or maintaining relatively constant temperature and humidity conditions in the growth chambers via opening and closing of air tunnels (Weber, 1956, 1972a, b).

Given these stable microenvironmental characteristics, reports of squamates occasionally laying their eggs in ant (and also termite) nests is not surprising (see reviews in Ferreira and Vanzolini 1985; Riley et al., 1985; Vaz-Ferreira et al., 1970). However, it is not clear whether these cases represent co-evolved interrelationships between these insects and the squamate species that nest with them, or if such reports simply represent isolated cases of nesting females making opportunistic use of an available optimal microenvironment. More information is needed on the details of such occurrences before firm conclusions may be made.

## MATERIAL AND METHODS

During the excavation of a leaf-cutter nest [*Acromyrmex octospinosus* (Reich, 1793)] on 10 February 2003 in the Sonson municipality (5º 42’ 06” N, 75º 23’ 07” W) in the Antioquia Department of Colombia, we discovered an egg clutch laid by the colubrid snake *Stenorrhina degenhardti* (Berthold, 1853). One of the six *S. degenhardti* eggs was inadvertently broken while opening the ant nest. The remaining five intact eggs and the bulk of the ant nest were transferred to a laboratory at the University of Antioquia, where an artificial nest containing three interconnected chambers was constructed. One chamber was used as a leaf cutting chamber, the second as a growth chamber, and the third as a garbage chamber. The ants adopted the growth chamber for rearing their fungus and offspring and the five snake eggs were placed there as well. Every two days, *Acalipha wilkesiana* (Euphorbiaceae) leaves were provided to the ants in the leaf-cutting chamber. We regularly recorded the temperature (ºC) and relative humidity (%) both of the laboratory environment and inside the leaf-cutting and garbage chambers of the artificial nest. These variables were not measured in the growth chamber to avoid disturbing the ants or possibly contaminating the fungus.

## RESULTS

The original ant nest was located at an altitude of 1,639 m in a sloped field that received direct sunlight. A small opening served as both the entrance and exit to the nest, but at 30 cm depth the nest opened widely into a cavity covered almost entirely with the fungi. The snake clutch was located within this main growth chamber of the nest. The snake egg that was broken while opening the ant nest contained an embryo of approximately 12 cm total length. The remaining intact eggs were of a white color, and continued to incubate an additional 36 days after their transfer to the laboratory. The percent relative humidity within the artificial ant nest was higher than that maintained outside in the laboratory environment (means of 82.3% vs. 58.3%, respectively). However, temperature values within and outside of the artificial nest differed little (means of 23.3 and 24.5 ºC, respectively), and were comparable to the temperature we recorded from within the natural ant nest in the field (24.0 ºC). During laboratory incubation of the eggs, the ants routinely moved over the eggs, partially covering them with fungi or clearing their exposed surfaces. The five snake eggs hatched over the course of a two day period. The ants were not obviously aroused by, nor did they behave aggressively towards, the neonate *S. degenhardti*, which averaged 14.2 (± 0.2) cm in total length and 2.24 (± 0.05) g in mass.

## DISCUSSION

Given that the temperature and humidity experienced by incubating reptile eggs affects hatching success rates, hatchling sizes, and even longer-term phenotypic traits such as juvenile growth rates and physical endurance (Burger, 1989, 1991; Shine et al., 1997), a stable incubation environment could have important fitness consequences to female squamates who select ant nests as oviposition sites. Other benefits of this incubatory inquilinism also might accrue; *Acromyrmex* nests can have formidable defenses against predators of squamate eggs. Also, the constant cleaning of the squamate eggs by the ants might help rid them of pathogenic fungi and bacteria. In this study, the ants not only tolerated the snake clutch within their growth chamber, but the workers also actively used the eggs as structures to support symbiotic fungal growth (Riley et al., 1985; Vaz-Ferreira et al., 1970). However, it is clear that interesting interspecific relationships may exist between nesting squamates and leaf-cutter ants that deserves more detailed study.

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## REFERENCES

**Burger J.** 1989. Incubation temperature has long-term effects on behaviour of young pine snakes (*Pituophis melanoleucos*). *Behavioral Ecology and Sociobiology,* 24:201-207.

**Burger J.** 1991. Effects of incubation temperature on behavior of hatchling pine snakes: Implications for reptilian distribution. *Behavioral Ecology and Sociobiology,* 28:297-303.

**Ferreira CR, Vanzolini PE.** 1985. Notes on incubatory inquilinism between Squamata (Reptilia) and the Neotropical fungus-growing ant *Acromyrmex* (Hymenoptera: Formicidae). *Papéis Avulsos de Zoología,* 36:31-36.

**Moreira AA.** 2000. Arquitetura, distribuição de sustratos e comparação entre os volumes externo e interno de ninhos de *Atta bisphaerica*, Forel, 1908 (Hymenoptera: Formicidae). Tesis Doutor, Universidade Estadual Paulista "Júlio Mesquita Filho", Facultade de Ciências Agronômicas Câmpus de Botucatu. Sao Paulo, Brasil.

**Quinlan RJ, Charret JM.** 1978. Aspects of the symbiosis of the leaf-cutting ant *Acromyrmex octospinosus* (Reich) and its food fungus. *Ecological Entomology,* 3:221-230.

**Riley J, Stimson AF, Winch JM.** 1985. A review of squamata ovipositing in ant and termite nests. *Herpetologica Revew,* 16:38-43.

**Shine R, Elphick MJ, Harlow PS.** 1997. The influence of natural incubation environments on the phenotypic traits of hatchling lizards. *Ecology,* 78:2559-2568.

**Vaz-Ferreira R, Zolessi LC, Achaval F.** 1970. Oviposición y desarrollo de ofidios y lacertilios en hormigueros de *Acromyrmex*. *Physis,* 79:431-459.

**Weber NA.** 1956. Evolution in fungus-growing ants. Pp. 459-473. *In:* Becker EC (ed.). *Proceedings of the X International Congress of Entomology.* Montreal, Quebec, Canada.

**Weber NA.** 1972a. *Gardening ants. The Attines.* The American Philosophical Society. Philadelphia (Pennsylvania), USA.

**Weber NA.** 1972b. The fungus culturing behaviour of ants. *American Zoologist,* 12:577-587.