

Intermorphic Queen in the Harvester Ant *Pogonomyrmex barbatus* (F. Smith) (Hymenoptera:Formicidae) in Tonalá, Jalisco, MexicoGabriela Castaño-Meneses¹ and Miguel Vásquez-Bolaños²

¹Ecología y Sistemática de Microartrópodos, Departamento de Ecología y Recursos Naturales, Facultad de Ciencias, Universidad Nacional Autónoma de México, D. F. 04510 México. gcm@hp.fciencias.unam.mx

²Entomología, Centro de Estudios en Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara, Apdo. Postal 234, Zapopan, Jalisco 45100 México. mvb14145@hotmail.com

Social insects have been amazingly successful in most terrestrial ecosystems (Wilson 1992) due to their capacity to work together to perform various tasks (Anderson et al. 2001). Members of insect societies with anatomic differences, division of work, and adaptations for reproductive functions are termed castes. Particularly in ants, the main castes known are males and females, among which are the queen (reproductive caste) and the workers (sterile, non-reproductive caste). However, in some ant species there are other reproductive forms, called intermorphic queens, which are anatomically similar to queens and workers and which coexist with winged queens.

Intermorphic queens are characterized by less thoracic development, loss of wings, and absence of ocelli. However, they have the same reproductive capacity in new colonies as do normal queens since they have the same number of ovarioles. Sometimes, there may be many queens of this type (Murakami et al. 2002). Here, we use the term "intermorphic" in accordance with Heinze (1998).

The genus *Pogonomyrmex* has shown a wide variation in nest founding strategies, which renders it one of the most interesting groups of ants in regards to the understanding of the evolution of this behavior (Johnson 2002). Most species are monomorphic, but polymorphic species are not rare, and species of intermorphic queens have been reported within the species of subgenus *Epehebomyrmex* (Heinze et al. 1992), while ergatogyny is occasional in *Pogonomyrmex* species (Kugler 1978). We record for the first time the presence of intermorphic queens within *Pogonomyrmex barbatus* (F. Smith).

Collections were made in Santa Cruz de las Huertas, Tonalá, (20° 32' - 20° 43' N, 103° 08' - 103° 17' W) in Jalisco State, Mexico. The annual average temperature in the area is 20°C (range 12.8-28.6°C), and the average precipitation is 900ml. Santa Cruz de las Huertas is an urban zone with sparse secondary vegetation. Manual collections were made during June 2003. We found one intermorphic queen (Fig. 1B) in a *Pogonomyrmex barbatus* colony on 11th June 2003. Normal queens (Fig. 1A) were found in the same nest. Features of the intermorphic queen were an absence of ocelli and wings (the specimen is wingless) as well as smaller size. Initially, this queen was mistaken for a worker (Fig. 1C); however, a microscopic evaluation demonstrated that it to be a queen because of the remains of wing insertions.

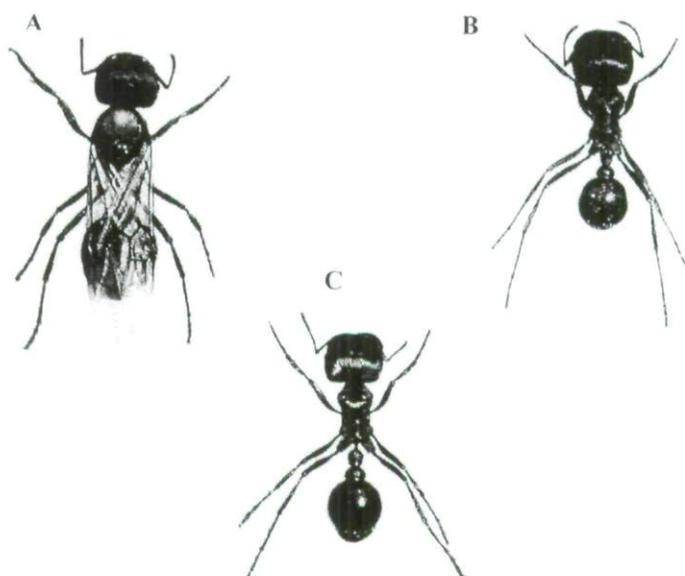


Fig. 1. A. *Pogonomyrmex barbatus* normal queen, B. Intermorphic queen, C. Worker

Measurements of the studied individuals are shown in Table 1. The size of intermorphic queens is clearly intermediate, between the normal queen and the workers; however, the cephalic index (head width X 100 divided by head length) is higher in the intermorphic queen.

Table 1. Average and Standard Error of Measurements and Indices of *Pogonomyrmex barbatus* Normal Queen, Intermorphic Queen, and Worker.

Measurement/Index ^a	Worker ^b	Normal Queen ^b	Intermorphic Queen ^b
Total Length	8.4 ± 0.13	11.9 ± 0.20	10.2
Head Width (HW)	2.3 ± 0.04	2.7 ± 0.04	2.8
Head Length (HL)	2.4 ± 0.07	2.7 ± 0.03	2.6
Pronotal Width (PW)	1.4 ± 0.02	2.5 ± 0.04	1.8
Mesosoma Length	2.4 ± 0.04	3.7 ± 0.03	3.0
Scape Length (SL)	1.6 ± 0.04	1.8 ± 0.04	1.5
Cephalic Index (CI) ^c	97.7 ± 1.94	101.7 ± 2.07	107.69
Scape Index (SI) ^d	69.4 ± 1.20	66.9 ± 1.91	53.57

^aMeasurements are expressed in mm; indices in percentage

^bWorker (n=20); normal queen (n=10); intermorphic queen (n=1)

^cCI = HW X 100/HL

^dSI = SL X 100/HW

The subfamily Myrmicinae has the most genera with polymorphic and wingless reproductive queens. Nevertheless, the total number of genera in the subfamily is 157 (Bolton 1995) and there are only 20 genera with wingless reproductive queens, representing only 12.7% of the total. In other subfamilies, like Ponerine, genera with wingless reproductive queens constitute about 45% of the total (Peeters and Ito 2001).

Intercaste colonies are more frequent in isolated habitats, usually at high latitudes, where there are habitat partitions and resources are patchily distributed as well as in disturbed habitats (Yamauchi et al. 1996). This explains the presence of the *P. barbatus* intermorphic queen in an urban area with great disturbance.

We thank M.P.E.S. Georgina A. Quiroz Rocha (UDG) for the photographs. Helpful reviews were provided by Dr. José G. Palacios-Vargas (FC-UNAM) and MS Francisco Serna (UNAL).

References Cited

- Anderson, C., N. R. Franks, and D. W. McShea. 2001. The complexity and hierarchical structure of tasks in insect societies. *Anim. Behav.* 62: 643-651.
- Bolton, B. 1995. A taxonomic and zoogeographical census of the extant ant taxa (Hymenoptera: Formicidae). *J. Nat. Hist.* 29: 1037-1053.
- Heinze, J. 1998. Intercastes, intermorphs, and ergatoid queens: who is who in ant reproduction? *Insect. Soc.* 45: 113-124.
- Heinze, J., B. Hölldobler, and S. P. Cover. 1992. Queen polymorphism in the North American harvester ant, *Ephebomyrmex imberbiculus*. *Insect. Soc.* 39: 267-273.
- Johnson, R. A. 2002. Semiclaustral colony founding in the seed-harvester ant *Pogonomyrmex californicus*: a comparative analysis of colony founding strategies. *Oecologia*, 132: 60-67.
- Kugler, C. 1978. Description of the ergatoid queen of *Pogonomyrmex mayri* with notes on the worker and male (Hym., Formicidae). *Psyche* 85: 169-182.
- Murakami, T., K. Ohkawara, and S. Higashi. 2002. Morphology and developmental plasticity of reproductive females in *Myrmecina nipponiica* (Hymenoptera: Formicidae). *Ann. Entomol. Soc. Am.* 95: 577-582.
- Peeters, C., and F. Ito. 2001. Colony dispersal and the evolution of queen morphology in social Hymenoptera. *Ann. Rev. Entomol.* 46: 601-630.
- Wilson, E. O. 1992. The effects of complex social life on evolution and biodiversity. *Oikos* 63: 13-18.
- Yamauchi, K., Y. Kimura, B. Corbara, K. Kinomura, and K. Tsuji. 1996. Dimorphic ergatoid males and their reproductive behavior in the ponerine ant *Hypoponera bondroiti*. *Insect. Soc.* 43: 119-130.

Copyright of *Southwestern Entomologist* is the property of Society of Southwestern Entomologists and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.