

GYNANDROMORPHIC DESERT FIRE ANT,  
*SOLENOPSIS AUREA* WHEELER  
(HYMENOPTERA: FORMICIDAE)<sup>1</sup>

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*Abstract.*—A gynandromorph of *Solenopsis aurea* Wheeler is described from an ant collected in western Texas. The specimen is predominantly that of a queen, but the head is noticeably male on the right half, female on the left half. The reproductive system, both internally and externally, is entirely female.

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Gynandromorphs are individuals which have the male and female sexual characters combined discretely. The character combinations can occur as right-left halves, dorsoventral halves, antero-posterior halves, or in patches, resulting in mosaics. Female ant characters can be contributed by any of the castes present: queen-male (gynandromorph), worker-male (ergatandromorph), and soldier-male (dinergatandromorph). Combinations of worker, queen, and male are also known (Donisthorpe, 1929).

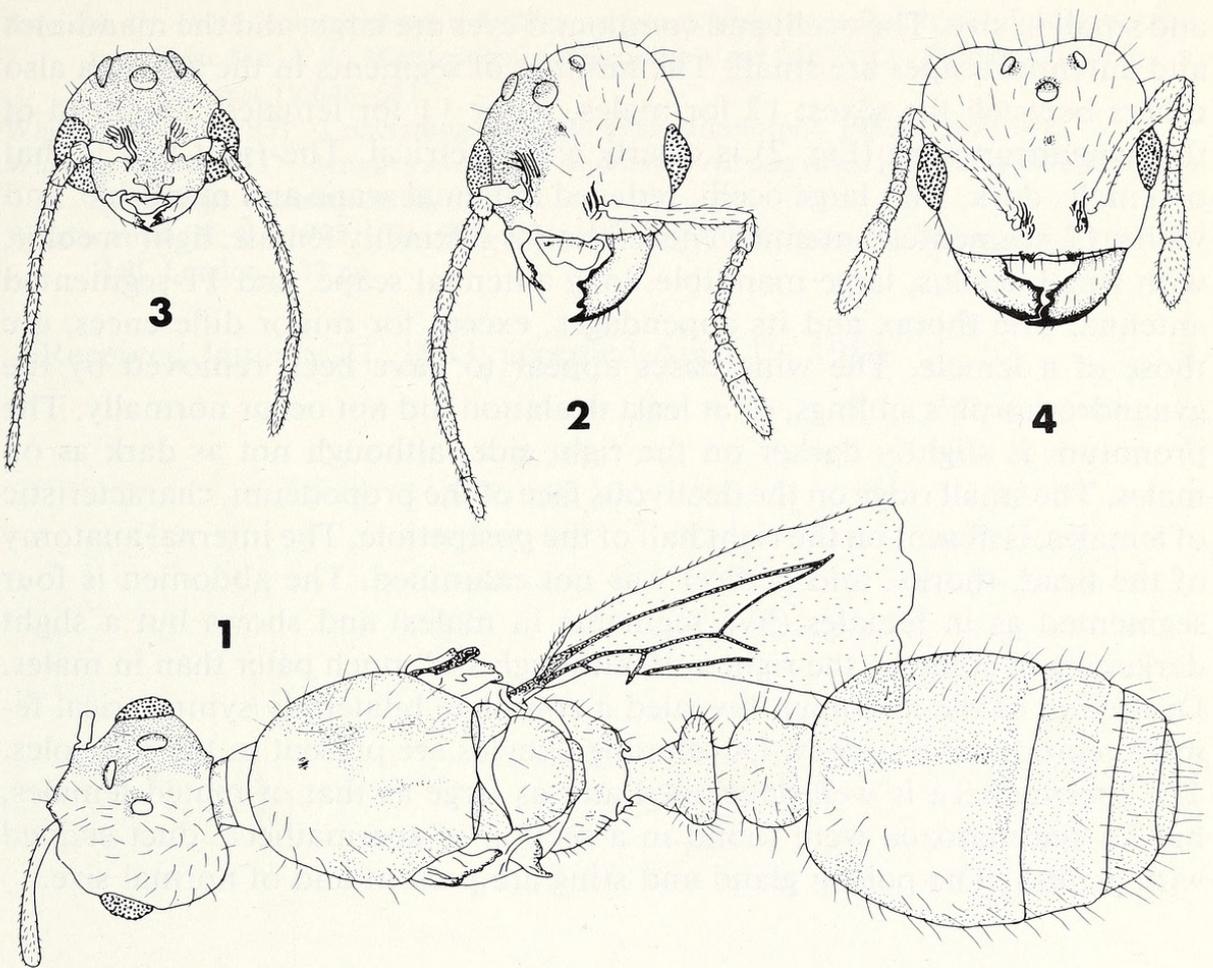
Numerous mechanisms have been proposed to explain the occurrence of gynandromorphs in animals. Most mechanisms deal either with fertilization-related phenomena or with cytogenetic complications during early embryogenesis. Morgan and Bridges (1919), Rothenbuhler et al. (1952), Brust (1966), and Wigglesworth (1972) provide useful reviews and discussions on the various mechanisms implicated in formation of insect gynandromorphs.

Gynandromorphs have been reported from 39 species in 22 genera of ants (Donisthorpe, 1929; Wheeler, 1931, 1937; Buschinger and Stoewesand, 1971; Hung et al., 1975). Two gynandromorphs have been reported from the genus *Solenopsis*. A red imported fire ant, *Solenopsis (Solenopsis) invicta* Buren, with male head, mosaic thorax, and female pedicel and gaster was described by Hung et al. (1975). A thief ant, *Solenopsis (Diplorhoptrum) fugax* Latreille, with female head and thorax, and male pedicel and gaster was reported by

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Figs. 1–4. *Solenopsis aurea*. 1. Dorsal view of gynandromorph. 2. Anterior aspect of gynandromorph head. 3. Anterior aspect of male head. 4. Anterior aspect of female head.

Santschi (1910). Another anomaly reported for the red imported fire ant is that of intercastes, female individuals exhibiting worker and queen characters (Glancey et al., 1980).

The present gynandromorph is that of a desert fire ant, *Solenopsis (Solenopsis) aurea* Wheeler, which is preserved along with normal male and female siblings (cat. no. 6461) in the Entomological collection, The Museum, Texas Tech University. Nineteen colonies of *S. aurea* were collected 2.6 miles ESE of Southland, Garza Co., Texas, on 4 June 1982 and were kept alive in the laboratory. On 15 June 1982 all the colonies were closely examined for the presence of external parasites, at which time the malformed ant was discovered. The gynandromorph and six male and female siblings were isolated on 2 July for closer observations. The gynandromorph, but not its siblings, died 6 July 1982.

The sexes of *S. aurea* are distinctive and easily separated. The gynandromorph (Figs. 1, 2) is predominantly female, with male characteristics most distinctive on the head. A normal male head (Fig. 3) is darkly pigmented

and small in size. The ocelli and compound eyes are large, and the mandibles and antennal scapes are small. The number of segments in the antenna also differs between the sexes: 12 for males, 10 or 11 for females. The head of the gynandromorph (Fig. 2) is clearly asymmetrical. The right half is that of a male: dark, with large ocelli, reduced antennal scape and mandible, and with a 12-segmented antenna. The left half is distinctly female: light in color, with small ocellus, large mandible, long antennal scape, and 11-segmented antenna. The thorax and its appendages, except for minor differences, are those of a female. The wing bases appear to have been removed by the gynandromorph's siblings, or at least dealation did not occur normally. The pronotum is slightly darker on the right side, although not as dark as on males. The small ridge on the declivous face of the propodeum, characteristic of females, is absent on the right half of the postpetiole. The internal anatomy of the head, thorax, and pedicel was not examined. The abdomen is four segmented as in females (five segments in males) and shows but a slight darkening in color on the right half, although still much paler than in males. Dissection of the abdomen revealed a complete bilaterally symmetrical female reproductive system. Developing oocytes are present in the ovarioles. The spermatheca is well developed and as large as that of mated females, but no spermatozoa were found in a section of spermathecal duct stained with giemsa. The poison gland and sting are present and of normal size.

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#### LITERATURE CITED

- Brust, R. H. 1966. Gynandromorphs and intersexes in mosquitoes (Diptera : Culicidae). *Can. J. Zool.* 44:911-921.
- Buschinger, A. and H. Stoewesand. 1971. Teratologische Untersuchungen an Ameisen (Hymenoptera : Formicidae). *Beitr. Ent.* 21:211-241.
- Donisthorpe, H. 1929. Gynandromorphism in ants. *Zool. Anz.* 52:92-96.
- Glancey, B. M., R. K. Vander Meer, A. Glover and C. S. Lofgren. 1980. Observations of intercastes in *Solenopsis invicta* Buren. *Florida Ent.* 63:346-350.
- Hung, A. C. F., W. N. Norton and S. B. Vinson. 1975. Gynandromorphism in the Red Imported Fire Ant, *Solenopsis invicta* Buren (Hymenoptera : Formicidae). *Ent. News* 86:45-46.
- Morgan, T. H. and C. B. Bridges. 1919. Contributions to the genetics of *Drosophila melanogaster*. I. The origin of gynandromorphs. *Carnegie Inst. Wash. Publ. No. 278*, pp. 3-122.
- Rothenbuhler, W. C., J. W. Gowen and O. W. Park. 1952. Androgenesis with zygogenesis in gynandromorphic honeybees (*Apis mellifera* L.). *Science* 115:637-638.

- Santschi, F. 1910. Contributions à la faune entomologique de la Roumanie, formicides capturées par Mr. A. L. Montandon et déterminées par Mr. le Dr. F. Santschi. Bull. Soc. Sci., Bucarest 19:648-651.
- Wheeler, W. M. 1931. Concerning some ant gynandromorphs. Psyche 38:80-85.
- Wheeler, W. M. 1937. Mosaics and Other Anomalies Among Ants. Harvard University Press, Cambridge, Massachusetts, 95 pp.
- Wigglesworth, V. B. 1972. The Principles of Insect Physiology, 7th Edition. Chapman and Hall, London, 827 pp.

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