

**The Male Genitalia and Terminal Segments of the Ponerine Ant  
*Rhytidoponera metallica* F. Smith (Hymenoptera: Formicidae)<sup>1</sup>**

JAMES FORBES AND MARTIN HAGOPIAN

BIOLOGICAL LABORATORY, FORDHAM UNIVERSITY, BRONX, N. Y. 10458

**Abstract** This paper, which gives the first descriptions and figures of the male genitalia and terminal segments for this ectatommid ponerine, shows that these structures conform to the usual formicid plan. The genitalia are composed of the outer, middle, and inner pairs of valves and the terminal segments are terga IX and X and sterna VIII and IX. The literature describing the male terminalia in ponerines is listed and comparisons are made with the few other ectatommid ponerines reported. Differences observed in the middle valves and in sterna IX add support to the view expressed in recent publications that these structures have diagnostic value for taxonomic purposes.

This paper presents the first descriptions and figures of the external genitalia and terminal gastral segments of the ectatommid ponerine, *Rhytidoponera metallica*. It adds to the growing literature which describes and compares these structures in male ants. These studies have revealed differences in these structures which might serve as distinguishing criteria in the difficult taxonomy of this group of insects (Weber, 1946, 1947, 1948, 1950; Borgmeier, 1950, 1955; Krafchick, 1959; Forbes and Brassel, 1962).

For the ponerine ants, observations on the male terminalia are limited to a few genera and species scattered through this subfamily. Emery (1911) has figured the genitalia of *Myrmecia pyriformis*, and Kennedy and Talbot (1939) have illustrated the undissected genitalia of *Proceratium silaceum* and sternites VIII and IX of this species. Weber (1946) has described the middle valves of *Ectatomma tuberculatum* and *ruidum* and *Paraponera clavata*, and Kempf (1954) has described the genitalic valves of *Thaumatomyrmex mutilatus*. In 1959 Krafchick examined the genitalia of 13 species of ponerines belonging to 11 genera and presented keys for separating the genera. Brown (1958) commented on the shape of the subgenital plate of *Paraponera clavata* and in a revisionary study of the ponerine Tribe Amblyoponini (1960) figured genitalic valves of *Myopopone castanea*, *Prionopelta punctulata*, *Amblyopone australis*, *A. belli*, and two indeterminate species of the *Amblyopone reclinata* group.

If this list is restricted to ectatommid ponerine references, there remain only the descriptions of the middle valves of the species observed by Weber, the examination of the genitalia of an undetermined species of *Ectatomma* by Krafchick, and the comment on the subgenital plate of *P. clavata* by Brown. Comparisons are made of *Rhytidoponera* and these related forms.

Dr. Roy Whelden supplied the males used in this study from nests maintained by Dr. Caryl Haskins of the Carnegie Institution of Washington, D. C.

<sup>1</sup> This study was supported, in part, by the National Science Foundation grant, G-24298.



These males emerged between September 15–25, 1961. They were fixed in alcoholic Bouin's fluid on September 30 and then were stored in 70% ethyl alcohol.

For this study, posterior portions of the gasters were severed under 70% alcohol, and the genitalic valves and terminal segments were removed. These structures were dehydrated in ethyl alcohol to 95% and were then mounted in diaphane. The terminology used here has been previously employed (Snodgrass, 1941; Forbes, 1952). A Bausch and Lomb Tri-simplex microprojector was used in preparing the drawings.

#### OBSERVATIONS

The genitalia, composed of three pairs of valves which are bound proximally by a lamina annularis or basal ring (Fig. 1), protrude ventrally from the posterior end of the gaster. They are covered dorsally by the ninth and tenth terga and ventrally by the ninth sternum or the subgenital plate. The ninth and tenth terga are wholly retracted beneath the eighth tergum except for the pygostyles. On the ventral side, the eighth sternum overlaps the anterior part of the subgenital plate.

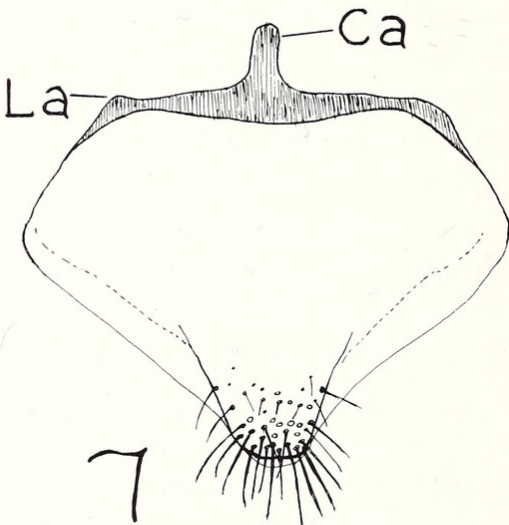
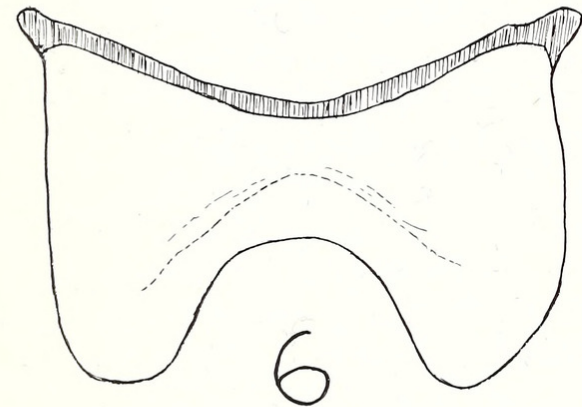
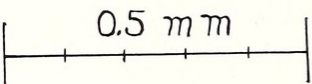
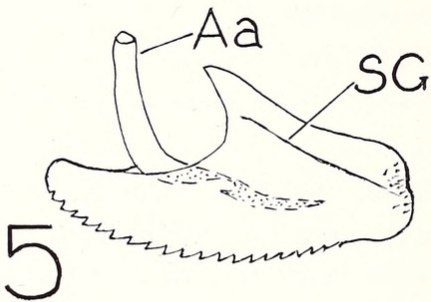
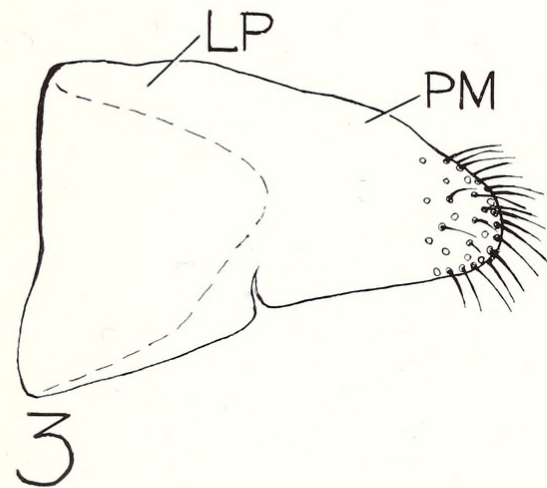
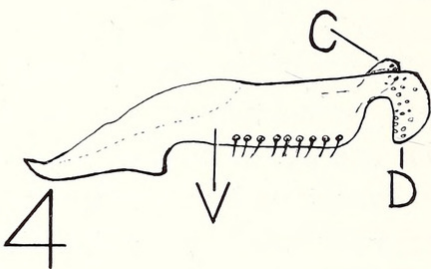
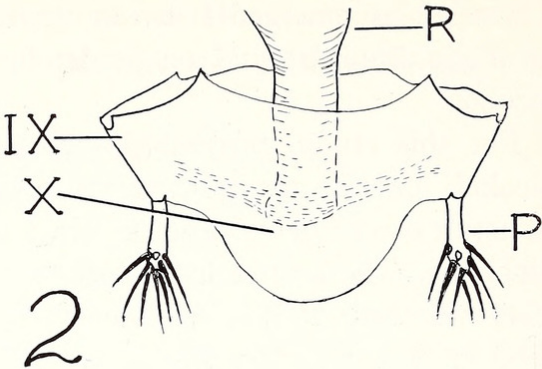
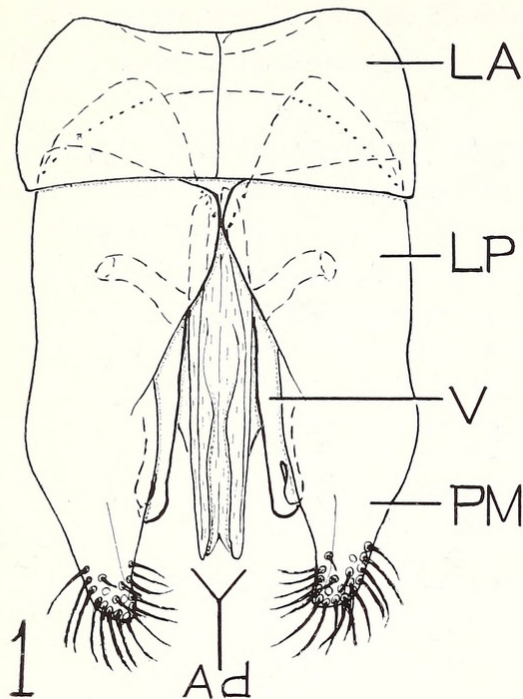
**Ninth and Tenth Terga** (Fig. 2). The ninth tergum is divided into two sclerites, which lie on each side of the membranous tenth tergum. The anal opening is found between the dorsal and the ventral surfaces of this tenth tergum, and the moderately sclerotized pygostyles are located on the posterolateral portions of this segment. A number of prominent, sensory hairs are found at the ends of the pygostyles.

**Ninth Sternum** (Fig. 7). This shield-shaped segment is strongly thickened along its anterior border. Centrally, this border bears an anterior projection, the cranial apodeme; laterally, it bears less conspicuous lateral apodemes. Sclerotization is heavier in the central and posterior portions, while the lateral margins remain unsclerotized. There are prominent sensory hairs on the posterior, median region of this segment.

**Eighth Sternum** (Fig. 6). This structure is roughly rectangular in shape with its anterior margin thickened and its posterior margin deeply indented. It is moderately sclerotized throughout except for the very weakly sclerotized posterior portion. No sensory hairs are found on this segment.

**Outer Valves** (Fig. 3). These, the largest of the genitalic valves, are composed of two parts, the broad, anterior lamina parameralis and the tapering, posterior paramere. These two parts are separated by a deep ventral slit. Their lateral surfaces are convex, and the valves tend to envelop the middle and inner valves. They meet at their dorsal, anterior margins but are separated ventrally and posteriorly. These valves are rather heavily sclerotized, the paramere more than the lamina parameralis. There are many sensory pores and hairs on the posterior end of the paramere.







**Middle Valves or Volsellares** (Fig. 4). Each volsellaris is composed of an anterior or basal portion, the lamina volsellaris, which is attached to the inner, anterior ventral surface of the lamina parameralis. The volsellaris bifurcates distally into two apical lobes, a lateral one, the cuspis volsellaris, and a median one, the digitus volsellaris. The cuspis projects dorsally slightly more than the digitus. The digitus is longer than the cuspis and has a pronounced hooked ending. The digitus tilts laterally in contrast to the cuspis which bends inwardly. The arrangement of the two lobes is pincerlike. Small sensory pegs, sensilla basiconica, are found on the cuspis and digitus, particularly on their opposing surfaces. There are short, stiff, sensory hairs on the ventral surface of the lamina volsellaris. The middle valves are the most heavily sclerotized of the genitalic valves.

**Inner Valves or Laminae Aedeagales** (Fig. 5). These moderately sclerotized valves are laterally compressed and joined dorsally by a poorly sclerotized membrane, the spatha. The ventral borders of the inner valves are free, and they are serrated except at their blunt, posterior ends. On the lateral wall there is a heavily sclerotized ridge, the aedeagal apodeme, which projects dorsolaterally beyond the valve. A distinct ridge of the sperm gutter is found on the upper, median surface of the lamina aedeagalis.

#### DISCUSSION

The male genitalia and terminal segments of *Rhytidoponera metallica* conform to the usual formicid plan. Also, these structures are generally similar to those in the ectatommids described and figured by both Weber (1946) and Krafchick (1959).

The figures of the middle valves of the species described by Weber and *R. metallica* show differences. For *Paraponera clavata*, Brown (1958) states, "the male subgenital plate is in the form of a slender, upcurved biramous fork"; this segment in *R. metallica* is different.

Krafchick's study of North American ants does not include *Rhytidoponera*, but it does include the genus *Ectatomma*; it is interesting to note that it is at this *Ectatomma* designation that the genitalia of *R. metallica* terminates when the key is used. A comparison of the segments of the *Ectatomma* species figured

←

FIG. 1. Dorsal view of genitalia showing valves in position. FIG. 2. Dorsal view of IXth and Xth terga. FIG. 3. Lateral view of outer valve. FIG. 4. Median view of middle valve. FIG. 5. Median view of inner valve. FIG. 6. Ventral view of sternum VIII. FIG. 7. Ventral view of sternum IX. All illustrations drawn to the same scale.

ABBREVIATIONS: Aa, aedeagal apodeme; Ad, aedeagus or laminae aedeagales; C, cuspis volsellaris; Ca, cranial apodeme; D, digitus volsellaris; La, lateral apodeme; LA, lamina annularis or basal ring; LP, lamina parameralis; P, pygostyle; PM, paramere; R, rectum; SG, sperm gutter; V, lamina volsellaris; IX and X, ninth and tenth terga.



by him and those of *R. metallica* also shows significant differences in the middle valves and in the subgenital plates.

Thus, the middle valves and subgenital plates are structures which could have diagnostic value for separating members of this group. In a similar descriptive study for some members of the genus *Polyergus* in the subfamily Formicinae (Forbes and Brassel, 1962), the same structures showed differences useful for taxonomic purposes.

#### Literature Cited

- BORGMEIER, T. 1950. Estudos sobre *Atta* (Hym., Formicidae). Mem. Inst. Oswaldo Cruz, **48**: 239-264.
- . 1955. Die Wanderameisen der Neotropischen Region (Hym., Formicidae). Editora Vozer Limitada, Petropolis, R.J. Brasil, **3**: 9-716.
- BROWN, W. L. 1958. Contributions toward a reclassification of the Formicidae. II. Tribe Ectatommini (Hymenoptera). Bull. Mus. Comp. Zool., **118**: 175-362.
- . 1960. Contributions toward a reclassification of the Formicidae. III. Tribe Amblyoponini (Hymenoptera). Bull. Mus. Comp. Zool., **122**: 145-230.
- EMERY, C. 1911. In Wytzman's Genera Insectorum. Fasc. 118, 124 pp. (Ponerinae).
- FORBES, J. 1952. The genitalia and terminal segments of the male carpenter ant, *Campopnotus pennsylvanicus* De Geer (Formicidae, Hymenoptera). Jour. N. Y. Ent. Soc., **60**: 157-171.
- , AND R. W. BRASSEL. 1962. The male genitalia and terminal segments of some members of the Genus *Polyergus* (Hymenoptera: Formicidae). Jour. N. Y. Ent. Soc., **70**: 79-87.
- KEMPF, W. W. 1954. A descoberta do primeiro macho do gênero *Thaumatomyrmex* Mayr (Hymenoptera, Formicidae). Rev. Brasil. Ent., **1**: 47-52.
- KENNEDY, C. H., AND M. TALBOT. 1939. Notes on the hypogaic ant, *Proceratium silaceum* Roger. Proc. Indiana Acad. Sci., **48**: 202-210.
- KRAFCHICK, B. 1959. A comparative study of the male genitalia of North American ants (Formicidae) with emphasis on generic differences. Dissertation, Univ. of Maryland, 78 pp. (Univ. Microfilms, Inc., Ann Arbor, Mich.).
- SNODGRASS, R. E. 1941. The male genitalia of Hymenoptera. Smithsonian Misc. Coll., **99**(14): 1-86.
- WEBER, N. A. 1946. Two common ponerine ants of possible economic significance, *Ectatomma tuberculatum* (Olivier) and *E. ruidum* Roger. Proc. Ent. Soc. Washington, **48**: 1-16.
- . 1947. A revision of the North American ants of the genus *Myrmica* Latreille with a synopsis of the Palearctic species. I. Ann. Ent. Soc. Amer., **40**: 437-474.
- . 1948. A revision of the North American ants of the genus *Myrmica* Latreille with a synopsis of the Palearctic species. II. Ibid., **41**: 267-308.
- . 1950. A revision of the North American ants of the genus *Myrmica* Latreille with a synopsis of the Palearctic species. III. Ibid., **43**: 189-226.

RECEIVED FOR PUBLICATION JULY 19, 1965



Forbes, James and Hagopian, Martin. 1965. "The Male Genitalia and Terminal Segments of the Ponerine Ant *Rhytidoponera metallica* F. Smith (Hymenoptera: Formicidae)." *Journal of the New York Entomological Society* 73, 190–194.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/206599>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/179902>

**Holding Institution**

Smithsonian Libraries and Archives

**Sponsored by**

Biodiversity Heritage Library

**Copyright & Reuse**

Copyright Status: In Copyright. Digitized with the permission of the rights holder

Rights Holder: New York Entomological Society

License: <http://creativecommons.org/licenses/by-nc/3.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.