THE MALE GENITIALIA OF BLATTARIA.
VI. BLABERIDAE: OXYHALOINAE*

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Princis (1965) included the following genera in the Oxyhaloidae: Oxyhaloa Brunner, Griffi niella Karny, Nauphoeta Burmeister, Henschontedenia Princis, Jagrehnia Princis, Coleoblatta Hanitsch, Pronauphoeta Shelford, Leucophaea Brunner, Pelloblatta Rehn, Heminauphoeta Saussure, Gromphadorhina Brunner, Ateloblatta Saussure, and Aeluropoda Butler. In this paper I shall illustrate the male genitalia of 8 of the above genera. I have not seen males of Coleoblatta, Heminauphoeta, and Ateloblatta. Princis (1961) included Pronauphoeta and Pelloblatta with a (?) in the Oxyhaloidae but did not question their placement in this family in his Catalogus (Princis, 1965). The male genitalia and subgenital plate of Pronauphoeta are so different from other members of the Oxyhaloinae [I follow McKittrick (1964) in using subfamily rather than family rank], that I do not include it in this subfamily. I have placed Pelloblatta in the Panchlorinae (Roth, 1971).

The genus Ploceophilus Rehn was placed by Rehn (1965) in the Oxyhaloinae; it includes one species, P. kohlsi Rehn which lives in the communal nests of the Social Weaver Bird in southwest Africa. According to Rehn (1965) the species is related to Oxyhaloa, and he stated that Ploceophilus could be separated from Griffi niella by its [Ploceophilus] lappet-like tegmina and absence of wings in both sexes. However, Princis (personal communication) believes that Rehn was wrong in his interpretation of Griffi niella and that Ploceophilus kohlsi is actually Griffi niella heterogamia Karny.

MATERIALS AND METHODS

The male genitalia of museum specimens were treated with 10% KOH, dehydrated, cleared in xylol and mounted in Permount.

The source of each of the specimens whose genitalia are illustrated is given using the following abbreviations: (AMNH) = American Museum of Natural History, New York; (ANSP) = Academy of Natural Sciences, Philadelphia; (BMNH) = British Museum

*Manuscript received by the editor June 4, 1970.
Fig. 1. Male genitalia of *Nauphoeta cinerea* (Olivier) (dorsal view). L1 = first sclerite of left phallomere; L2vm = median sclerite of left phallomere (L2 ventromedial); L2d = dorsal sclerite of L2; R2 = hooked sclerite of right phallomere; ret = retractable portion of R2 which lies in a membranous sheath.

(Natural History), London; (CSIRO) = Division of Entomology, CSIRO, Canberra, Australia; (CUZM) = Copenhagen University, Zoological Museum, Denmark; (L) = Zoological Institute, Lund, Sweden; (N) = U. S. Army Natick Labs., Natick, Mass.; (USNM) = United States National Museum, Washington, D. C.

The number preceding the abbreviations refers to the number assigned the specimen and its corresponding genitalia (on a slide) which are deposited in their respective museums.

**Results and Discussions**

Princis (1961, p. 444) used the male subgenital plate as his final key character in distinguishing the Oxyhaloidae. This plate has a laterally directed recurved pointed projection posterior to each stylus (Figs. 2-5; arrows in 3). McKittrick (1964, p. 45) suggested that this shape may be the closest to the ancestral type and that all other shapes of subgenital plates in the Blaberidae could be derived from it by differential reduction. The subgenital plate is an excellent character for distinguishing Oxyhaloinae because the internal genitalia (Fig. 1) of the 8 genera used in this study are all basically similar. The L2d is separated from L2vm, and is a sclerotized plate
which is an integral part of the preputial membrane. The prepuce has no distinctive shape, other than this sclerotization. The L1 is markedly reduced and, in most species, its sclerotization is restricted mainly to the region of the cleft. The tip of the genital hook (R2) is more lightly sclerotized than the main body of the hook, and in some species is a separate pointed or rounded lobe which may break off. Gurney (1965) has drawings of the genital hooks of *Nauphoeta cinerea* and three species of *Henschoutedenia*, but erred in indicating that they are part of the left phalломere.

The genera listed earlier are arranged linearly according to Princis (1965). The genitalia are essentially so basically similar in the genera studied here that there is little reason to alter this arrangement. However, there are certain differences in structure of L2d and R2 which allow the genera to be placed into three tribes.

1. Oxyhaloini (*Oxyhaloa*) (Figs. 29-46). Characteristically the upper right side of the L2d is extended into a long relatively narrow arm (Figs. 29, 32, 35, 38, 41, 44). The genital hook (R2) differs from all other genera of Oxyhaloinae. The rounded outer surface has minute setae and the apical lobe appears to arise from the dorsal surface as a thinly sclerotized membrane and extends from behind the tip of the darkly pigmented hook (Figs. 30, 33, 36, 39, 42, 45).

2. Nauphoetini (*Griffiniella, Nauphoeta, Henschoutedenia, Leucophaca, and Jagrchnia*) (Figs. 6-25, 47-139). The curved genital

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Hook is usually relatively slender and its tip in some species appears to be a distinct joint attached to the main body of the hook, or it is a more lightly pigmented point which blends into and is an integral part of R2 (Figs. 120, 123, 126, 129). Gurney (1965, p. 11) stated that in *N. cinerea*, *H. procera*, *H. flexivitta*, and *H. tectidoma* the genital hook differed "... in closeness of the apex to the opposite base, and in the position and shape of the flange near the base." The flange (Fig. 72, f) is found in *Leucophaea* and *Jagrehnia*, but may be poorly developed (Figs. 81, 105) or absent (Figs. 129, 132, 135, 138) in some species of these genera.

In *Jagrehnia idonea* and *J. madecassa*, R2 appears to be closer to the Gromphadorhini (see below) than to other species of *Jagrehnia*. Apparently the tips have been broken off (Figs. 132, 135, 138) and these resemble the damaged genital hooks (Figs. 155-157) of *Gromphadorhina*. The genital hooks of *Jagrehnia* can be arranged to show a trend from an elongated slender form (Fig. 111) to a stouter (Fig. 129) more robust shape (Fig. 138) approaching that found in the Gromphadorhini (Fig. 157). *Jagrehnia idonea*, *J. madecassa*, and *Gromphadorhina* spp. are all Malagasy species.

3. *Gromphadorininini* (*Gromphadorhina, Aeluropoda*) (Figs. 26-28, 140-157). In this tribe the retractable portion of R2 is unusually short and therefore cannot be extruded to the same extent found in other genera of Oxyhaloinae (and most other species of Blaberidae). The genital hook is robust, black, and the tip is lightly pigmented and resembles a nonarticulated segment. In *Gromphadorhina* there is a distinct indentation on the inside margin between the tip and main body of the hook (Figs. 144 [arrow], 147, 150, 153).

The retractable portion of R2 (Fig. 1, ret) of males of Blattaria in which females mount and palpate his dorsum prior to copulation, is relatively long. Thus, the genital hook is extruded for a considerable length and is used in the initial seizure, or to pull down the female's subgenital plate while she is above him. The short retractable portion of R2 in *Gromphadorina* probably is correlated with the difference in precopulatory behavior of this genus. In *G. portentosa* the female does not mount and palpate the male's dorsum during courtship; the male simply backs into the female to make connection (Barth, 1968). Nothing is known about the mating behavior of *Aeluropoda*, but it may be similar to *Gromphadorhina*. 
Figs. 65-73. Male cockroach genitalia of Henschoutenedenia spp. 65-67. (1452 L). *H. tectidoma* (from specimen shown in Fig. 11). 68-69. (188 USNM). *H. sordida* (Shelford). Allotype of *Nauphoeta procera* Rehn, a synonym. Mt. Coffee, Liberia. 70-73. *H. elegans*. 70. (28 CUZM) (from specimen shown in Fig. 7). 71-73. (135 ANSP). Lolodorf, Cameroon. (f = flange). (scale = 0.2 mm).
Figs. 74-82. Male cockroach genitalia of *Henschoutedenia* spp. 74-76. (*H. mombuttu* (from specimen shown in Fig. 8). 77-79. *H. occidentalis*. 77. (1451 L). (from specimen shown in Fig. 10). 78-79. (31 CUZM). (det. Princis). 80-82. (1453 L). *H. bicolor*. (from specimen shown in Fig. 13). (scale = 0.2 mm).
Figs. 83-91. Male cockroach genitalia of *Leucophaea* spp. 83-85. (131 ANSP). *L. capelloi*. (from specimen shown in Fig. 14). 86-88. (25 AMNH). *L. capelloi*. Niangara, Congo (det. Rehn). 89-91. (152 ANSP). *L. puerilis*. Paratype. (from specimen shown in Fig. 18). (scale $= 0.2$ mm).
Figs. 119-130. Male cockroach genitalia of *Jagrechnia* spp. 119-121. (162 ANSP). *J. gestroiana*. (from specimen shown in Fig. 20). 122-124. (123 ANSP). *J. invisa circumdata*. (from specimen shown in Fig. 23). 125-127. (1455 L). *J. invisa invisa*. (from specimen shown in Fig. 24). 128-130. (1456 L). *J. testacea*. (from specimen shown in Fig. 22). (scale = 0.2 mm).
Figs. 131-139. Male cockroach genitalia of *Jagrehnia* spp. 131-133. (173 ANSP). *J. idonea*. (from specimen shown in Fig. 25). 134-136. (159 ANSP). *J. madecassia*, Madagascar (det. Rehn). 137-139. (1457 L). *J. madecassia*. (from specimen shown in Fig. 21). (scale = 0.2 mm).
SUMMARY

The male genitalia of 8 genera of Oxyhaloinae show remarkable basic uniformity of characters, especially in the structure of L2d and the marked reduction in L1. Differences in characters of the genital hooks (R2) were used to separate the genera into three tribes as follows:

1. Oxyhaloini. — Oxyhaloa.

ACKNOWLEDGMENTS

I thank the following for the loan of museum material: Dr. N. Jago, Academy of Natural Sciences, Philadelphia, Dr. Jerome G. Rozen, Jr., American Museum of Natural History, New York, Dr. David R. Ragge, British Museum (Natural History), London, Dr. S. L. Tuxen, Zoological Museum, Copenhagen, Dr. Karl Princis, Zoological Institution, Lund University, Sweden, Dr. Ashley Gurney, United States National Museum, Washington, D. C., and Dr. K. H. L. Key, CSIRO, Canberra, Australia. I also thank Mr. Sam Cohen for taking the photographs.

REFERENCES


