

R30-30

### Tergal and Cercal Secretion of *Blatta orientalis* L.

A greyish viscous secretion (Fig. 1, bottom) accumulates on the terminal abdominal segments of adult females and nymphs of both sexes of *Blatta orientalis* (1) and nymphs of *Nyctibora lutzi* Rehn and Hebard (2), and on the cerci of nymphs of *Blattella germanica* (L.) (3).

We and George Riser, formerly of this laboratory, observed that this mucouslike secretion accumulated on the cerci and terminal abdominal segments of both sexes of nymphs of the following oviparous species of cockroaches, particularly when the insects were isolated or when small numbers were kept together in a large container: *Blattella germanica*, *B. vaga* Heb., *Periplaneta americana* (L.), *P. brunnea* Burm., *P. australasiae* (Fab.), *Supella supellectilium* (Serv.), *B. orientalis*, *Parcoblatta pennsylvanica* (Deg.), *Neostylopyga rhombifolia* (Stoll), *Eurycotis floridana* (Walk.), and *Ectobius livens* (Turt.) (4). We have not found the secretion on isolated nymphs of the viviparous species *Diploptera dytiscoides* (Serv.) or on the following false ovoviviparous species: *Blaberus craniifer* Burm., *Pycnoscelus surinamensis* (L.), *Leucophaea maderae* (Fab.), and *Nauphoeta cinerea* (Oliv.).

In *Blatta orientalis*, the material is secreted by the cerci and by glandular cells in tergites 6 and 7. We removed the cerci of oriental cockroach nymphs, and the secretion built up quickly on the tergites.

We collected secretion weekly from isolated nymphs and, after several months, had accumulated enough for analysis. The dried secretion was tan-colored and amorphous. It became soft and moist at 166°C and began to decompose by charring at approximately 205°C. It was soluble in water and insoluble in petroleum ether.

The analysis of this material was as follows: An estimated 10 percent by weight of the dry sample was combined carbohydrate as detected by the anthrone reaction. A negative test for free sugars as reducing sugars was obtained using triphenyltetrazolium chloride. No reducing sugar was present after hydrolysis, but a polysaccharide was indicated

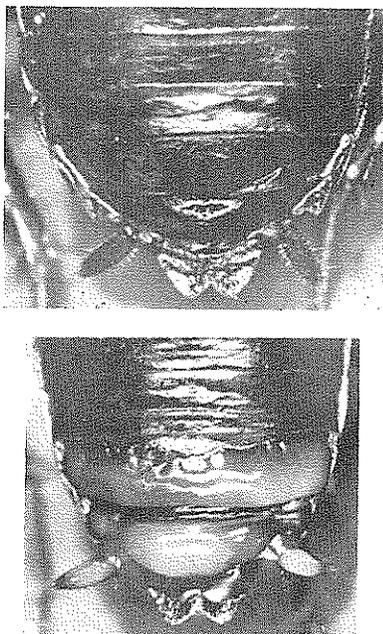


Fig. 1. Terminal, dorsal abdominal segments of adult females of *Blatta orientalis* ( $\times 4.6$ ). (Top) Specimen from crowded culture has very little secretion on the tergites and cerci. (Bottom) Isolated virgin 2 weeks old accumulated a large amount of cloudy secretion on the sixth and seventh tergites and the cerci. The clear fluid on the supra-anal plate and around the bases of the cerci was probably exuded from the anus when the insect was anesthetized with  $\text{CO}_2$ . [Photographs by E. R. Willis]

by its reaction with aniline phthalate reagent. Chlorides and phosphorous were present qualitatively in trace amounts, further indicating the inhomogeneity of the sample. There was an average of 1.90 percent ash. Averages of duplicate elemental analyses gave the following: 14.30 percent nitrogen, 45.85 percent carbon, 7.21 percent hydrogen, and 0.45 percent sulfur.

About 90 percent of the sample was calculated to be protein. The following amino acids, qualitatively identified by paper chromatography, were present in the protein hydrolyzate: aspartic acid, glutamic acid, serine, glycine, tyrosine, alanine, methionine, leucine (isoleucine?), proline, and lysine. If one assumes that the entire amount of sulfur was found in methionine, since no cystine

was present, then 2.1 percent methionine was present. This order of magnitude was indicated in the methionine spot on the two-dimensional paper chromatogram. Four percent of the total nitrogen existed as the free amino acid glycine and an unidentified free di- or tripeptide, as estimated by two-dimensional paper chromatography.

The function of the secretion is unknown; the significance, if any, of the absence of this material in viviparous and false ovoviviparous cockroaches is not understood. Stock and O'Farrell (3) suggested that in *Blattella germanica* the secretion may help keep the young nymphs together in loose aggregations; but our observations of colonies of cockroaches that secrete this material do not support this idea. Although we have seen cockroaches in aggregates, we have never seen any form of "webbing" or fibers that might tend to keep the insects together.

The fact that the material accumulates rapidly on the backs of isolated individuals (Fig. 1) indicates that in crowded cultures (where the secretion is rarely seen) the secretion is either rubbed off or perhaps eaten off by the insects. The oriental cockroach is capable of eating the material despite its viscous nature. On 9 May 1952, Edna Roth and Marc Roth observed a newly emerged adult of *Blatta orientalis*, which had been isolated for several weeks as a nymph, eat its own secretion and exuvia. If a type of trophallaxis exists among some species of cockroaches, whereby nymphs eat this material off each other, it is conceivable that the secretion, high in protein, could serve as a supplemental food.

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#### References and Notes

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2. G. N. Wolcott, *J. Agr. Univ. Puerto Rico*, 1948 32, 1 (1950).
3. A. Stock and A. F. O'Farrell, *Australian J. Sci.* 17, 64 (1954).
4. We have recently noted this secretion on nymphs of *Loboptera decipiens* (Germar).