



This work is licensed under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 United States License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/us/> or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

WAX SECRETION IN THE INFRARED SENSORY PIT  
OF *MELANOPHILA ACUMINATA* (COLEOPTERA: BUPRESTIDAE)

WILLIAM G. EVANS

Department of Entomology

University of Alberta

Edmonton, Alberta T6G 2E3

*Quaestiones Entomologicae*

11: 587-589 1975

*Exposing dry, untreated infrared sensory pits of Melanophila acuminata to osmium tetroxide vapors for 72 hours made it possible to examine wax extrusions from glands adjacent to the infrared sense organs. Scanning electron microscope photographs of the sensory pit, wax extrusions and coalesced wax fibers are included.*

*Utilisant des fosses sensorielles de l'infra-rouge asséchées et non traitées de la Melanophila acuminata que nous avons exposées aux vapeurs du tétrioxide d'osmium pendant 72 heures, il nous fut possible d'examiner des expulsions de cire provenant de glandes voisines des organes sensoriels de l'infra-rouge. De plus nous incluons des photographies prises à l'aide du microscope électronique à balayage des fosses sensorielles, des expulsions de cires et des anastomoses des fibres de cire.*

The sense organs of *Melanophila acuminata* that detect infrared radiation from forest fires are situated in two pits posterolaterad to each middle coxal cavity (Evans, 1966a, 1966b). Multi-pore wax glands adjacent to each sense organ secrete fine filaments of wax that coalesce with other wax filaments so that the sensory area is covered by a fibrous mass of wax, as shown in Fig. 1. Since the wax is secreted continuously and the fibrous masses are sloughed out of the pits periodically, this mechanism probably serves to protect the sense organs from high concentrations of smoke and dust particles associated with fires. The wax could also function to prevent

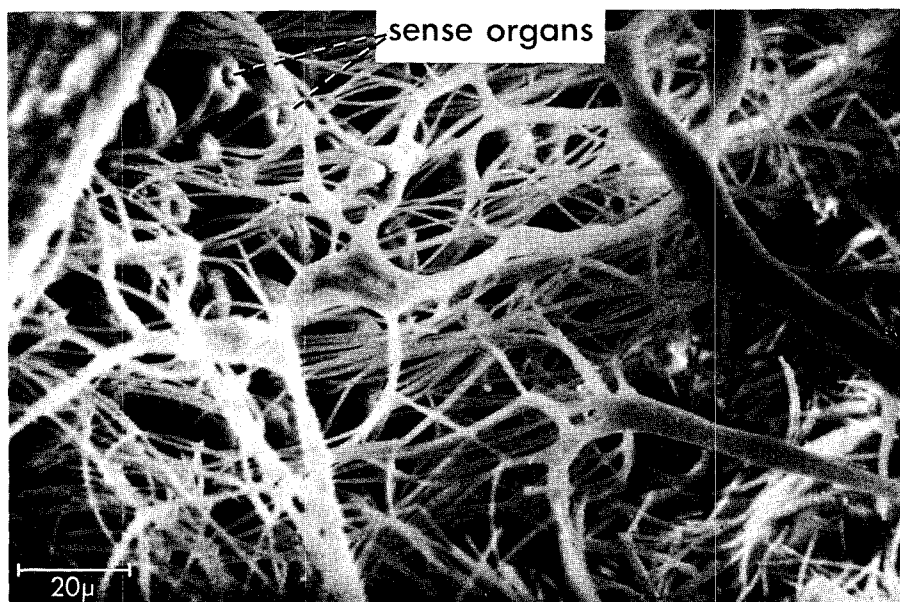


Fig. 1. A portion of the infrared sensory pit of *Melanophila acuminata* showing some of the sense organs but mainly the fibrous nature of the wax covering the pit.

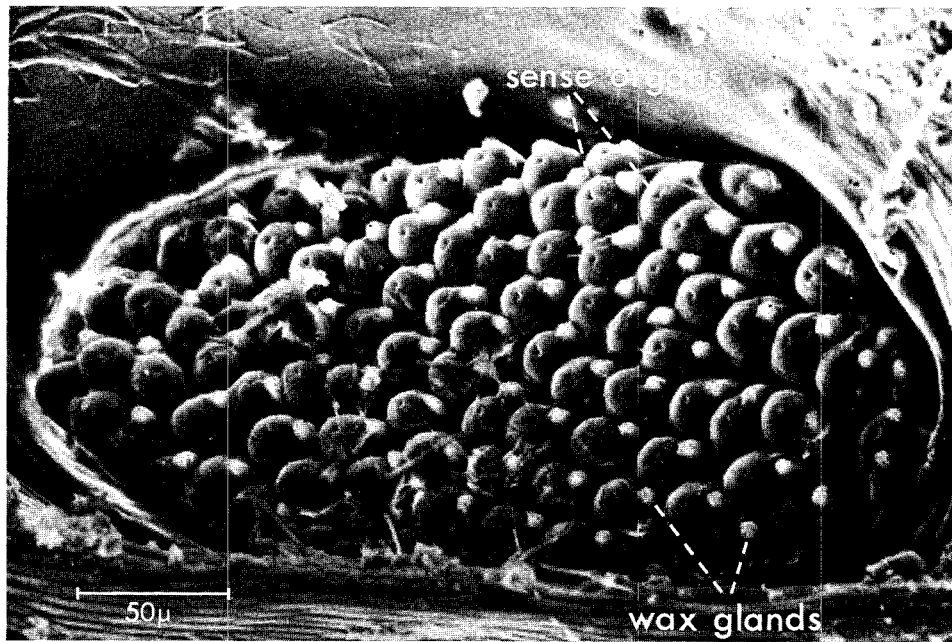


Fig. 2. The infrared sensory pit of *M. acuminata* with the wax removed revealing wax glands and sense organs.

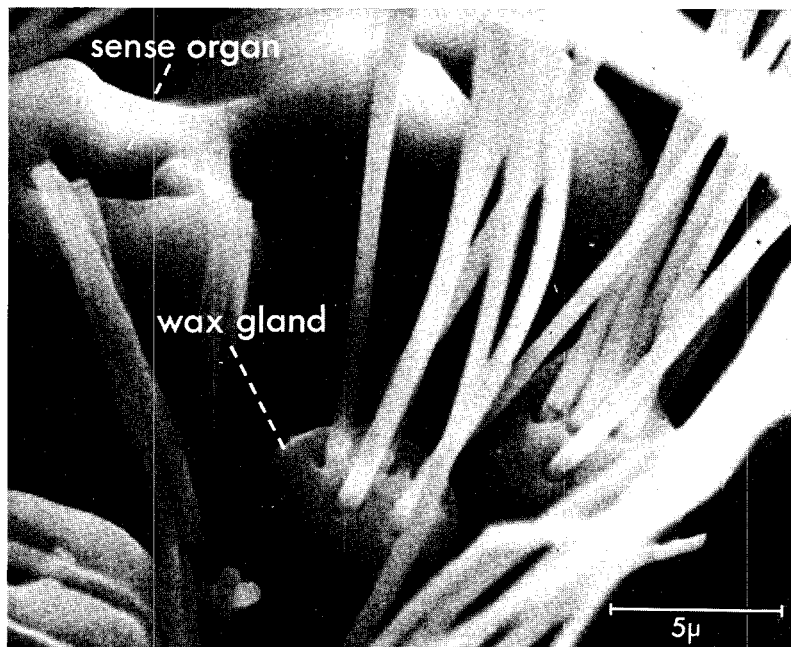


Fig. 3. Wax extrusions in the infrared sensory pit of *M. acuminata*.

excessive water loss from the thin, unsclerotized cuticle of the sense organs and adjoining areas in the pit. The mechanism for this is unknown but the filaments could simply slow the diffusion of water vapor across the gradient of high concentration inside the pit to the low concentration outside.

Until recently the only evidence that these glands actually secreted wax was the demonstration of esterases in the pore canals, shown by the bromoindoxyl acetate method of staining, and broken wax filaments at or near the pores seen in generally unsatisfactory whole mounts of the sensory pits in glycerin (Evans, 1966). Examination of sensory pits with the scanning electron microscope did not give satisfactory results because of charging of the poorly grounded wax; however, exposure of untreated sensory pits to osmium tetroxide vapors (Pfefferkorn, 1970) for 72 hours prior to coating with carbon and gold solved this problem.

Sensory pits treated in this manner were examined in an S4 Stereoscan, Scanning Electron Microscope and photographed on Kodak Plus-X film. Fig. 2 shows the sensory pit with the wax removed and Fig. 3 shows wax filaments extruded from the wax pores. These filaments, approximately 0.7 microns in diameter, extend for about 10-15 microns before uniting with other filaments or groups of filaments. As seen in Fig. 1 the process of coalescence results in a tangled, fibrous mass of wax with some pieces approximately 4.0 microns in diameter. Nevertheless, there appear to be adequate spaces between the wax filaments to allow 2 to 4 micron wavelength radiation to pass through from the outside to stimulate the sense organs. It is also possible that the wax itself transmits these wavelengths, in which case the dimensions of the spaces are not important considerations.

I would like to thank George Braybrook for providing the photographs.

#### REFERENCES

- Evans, William G. 1966a. Perception of infrared radiation from forest fires by *Melanophila acuminata* De Geer (Buprestidae, Coleoptera). *Ecology* 47: 1061-1065.
- Evans, William G. 1966b. Morphology of the infrared sense organs of *Melanophila acuminata* (Buprestidae: Coleoptera). *Annals of the Entomological Society of America*. 59: 873-877.
- Pfefferkorn, G. E. 1970. Specimen preparation techniques. *Proceedings of the 3rd Annual Scanning Electron Microscope Symposium*. IITRI, Chicago. pp. 89-96.