JUVENILE HORMONE ACTIVITY FROM VARIOUS SOURCES OF TERMITE CASTES AND THEIR FUNGUS GARDENS

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RESUME

L'activité de l’hormone juvénile (JH) est mise en évidence à partir d'extraits de contenu rectal d’ouvriers et de soldats et d'exsudat anal de reines de termites, Microtermes sp., Microcerotermes beesoni (Snyder), Odontotermes obesus (Rambur), O. qurdaspurensis (Holmgren) et O. assimuthi (Holmgren), ainsi que du champignon Termitomyces sp. qui est présent dans la termitière. La signification possible de JH provenant de différentes sources, castes de termites ou champignons, est discutée.

SUMMARY

Juvenile hormone (JH) activity is shown by extracts of the rectal contents of workers and soldiers, and anal exudate of queen of the termites, Microtermes sp., Microcerotermes beesoni (Snyder), Odontotermes obesus (Rambur), O. qurdaspurensis (Holmgren) and O. assimuthi (Holmgren) as well as the fungus, Termitomyces sp. which is present in the termitaria. The possible significance of JH from various sources of termite castes and their fungus gardens is discussed.

ZUSAMMENFASSUNG

Es wurde festgestellt, dass bei den Termiten Microtermes sp., Microcerotermes beesoni (Snyder), Odontotermes obesus (Rambur), O. qurdaspurensis (Holmgren) and O. assimuthi (Holmgren). Extrakte aus dem Analexkret der Königin und aus dem Pilz des Termietenhaus (Termitomyces sp.) eine Juvenilhormonaktivität (JH) zeigen. Die wahrscheinliche Bedeutung dieserer Juvenilhormonaktivität aus verschreiten Termietenkasten und ihrer Pilzkulturen wird diskutiert.

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INTRODUCTION

The biological function of juvenile hormone (JH) of insects is the determination of larval characters at the moult, so that when the larva moult it will retain its larval characters and do not differentiate into an adult (Wigglesworth, 1957). Extracts with JH activity have been prepared from several sources of invertebrate and vertebrate phyla (see review by Wigglesworth, 1964), paper (Slama and Williams, 1966), certain commercial insecticide synergists (BowEas, 1968) and methanol (Hinzte-PODVAL, 1971). All the active extracts prevented certain tissues of immature insects from attaining their adult stage, but did not intrude the growth itself. The present communication reports the presence of JH activity in the extracts of the rectal contents of workers and soldiers, the anal exudate of queens and the fungus gardens that are present in their mounds of some termites and its significance.

Materials and methods.

Gasters of live worker and soldier termites, ranging in length from 3 to 7 mm., were dissected under distilled water to free the swollen rectum. The rectum varied in volume from 0.1 to 0.6 μl, averaging 0.3 μl. The contents were removed with a very fine glass needle attached to a syringe, and pooled directly in chloroform in separate vials. The external dimensions of the rectum were determined using an ocular micrometer. The volume was determined assuming a cylindrical geometry for the rectum.

About 250 μl of anal exudate, which oozes from the rectum of mature queen termites was « milked » with microcapilaries from 25 mature queens of each of the five species. The exudate of queens of different species of termites was individually extracted with chloroform.

Pure cultures of fungi, cultivated by the termites were isolated from the mounds by standard methods (Sannasi, 1969) and were dropped directly in chloroform.

The extracts were mailed to the United States and the morphogenetic (JH) activity was determined in Tenebrio assays. JH activity was measured by treating the penultimate stage of the insect with each extract and examining it after its last moult toward the adult from the retention of immature features. Freshly moulted pupae of the yellow mealworm, Tenebrio molitor (L.) were treated topically on the venter of the abdomen with the test sample of 1 μl of chloroform and held until the following moult with JH activity was signaled by the presence of immature features. Three separate trials were conducted for each extract and 15 insects were used in each trial.

Results and discussion.

JH activity was noticed in all of the extracts, but the range of activity varied in the different extracts as shown in Table 1. Anal exudate of physogastric queens of higher termites which is a mixture of excretory products (Mukerji and Raychaudri, 1942) and secretion of the collerterial glands (Marquis, 1952), plays an important role in the economy of the termite colony in as much as it is exchanged between different members of a colony. The exudate is eagerly licked by the worker and soldier castes, which tend and feed the queen with the stomodeal food (Escherich, 1911). Holmgren (1908) reported that the more