Comparison of Metabolic Features of Indole-3-Acetic Acid in the Gut among Five Species of Heteropterous Insects\textsuperscript{1,2}

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Many heteropteran insects convert indole-3-acetic acid (IAA) to metabolites in their guts and the metabolic features are classified into four types according to the relative color strength of the spots (IAA metabolites) appearing on TLC (Hori, 1979b). Among them, only a bug species belonging to the family Acanthosomatidae (Hemiptera) is classified in type IV in which the spots stronger in color (or many metabolites) occur near Rf 0.5. In many bugs belonging to the other families, Pentatomidae, Coreidae, Lygaeidae and Miridae (Hemiptera), strong spots appear near Rf 0.15. In the present study, the types of IAA metabolism of three acanthosomatids were compared with those of two pentatomids.

The bugs, Plautia stali SCOTT and Leila decempunctata MOTSECHULSKY (Pentatomidae), and Acanthosoma denticauda JAKOVLEV, A. haemorrhoidale angulatum JAKOVLEV and Elasmotethus humeralis JAKOVLEV (Acanthosomatidae) were used for this experiment. All bugs were collected from the trees, Sorbus commixta HEDL., on the campus of Obihiro University. The procedures for the collection of excreta and the thin layer chromatographic (TLC) analysis for IAA metabolites in excreta were the same as those described by Hori (1979b). The solvent system used in this experiment was butanol-ethanol-water (76:19:5, v/v).

Fig. 1 shows TLC analyses of the excreta from the five species. As expected, Plautia stali (Ps) and Leila decempunctata (Ld) converted IAA to five IAA metabolites (spot A=Rf 0.18-0.20, B=Rf 0.15-0.16, C=Rf 0.10-0.13, D=Rf 0.27-0.28 and E=Rf 0.50) in their guts, and the metabolic feature was classified as the type II (B>C≥A). On the other hand, Acanthosoma denticauda (Ad), A. haemorrhoidale angulatum (Ah) and

\begin{figure}[h]
\centering
\includegraphics[width=0.8\textwidth]{fig1.png}
\caption{TLC of IAA metabolites in the excreta of IAA-fed bugs: H; high color strength, M; medium color strength, L; low color strength, T; trace. See text for abbreviations of species names.}
\end{figure}

Elasmotethus humeralis (Eh) converted IAA to more than six IAA metabolites (in addition to spots B, C, and E, spot E₁=Rf 0.56, E₂=Rf 0.45-0.46, E₃=Rf 0.41 and F=Rf 0.01), the metabolic feature being judged to belong to type IV (E>B>C).

Many heteropterous bugs have an ability to convert IAA to some high molecular substances and excrete most parts of them (MILLS and Hori, 1977; Hori and Endo, 1977; Hori, 1979a, b; Hori et al., 1979). The five species of bugs in this experiment also had such an ability. Moreover, it was found in the present study that the metabolic pattern of IAA (type IV) in the bugs belonging to Acanthosomatidae was quite different from those (types I to III) in bugs belonging to other families. Type IV might represent a special physiological feature of bugs of the family Acanthosomatidae.

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REFERENCES

In Vivo Infectivity of Early and Late Passaged Heliothis zea Polyhedra Produced in Tissue Culture\(^1,2\)

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The Heliothis zea single embedded virus (SEV) is a member of the family Baculoviridae. The virus is highly pathogenic for the cotton bollworm Heliothis zea known also as corn earworm, and it has been approved for large-scale use as an insecticide. Although in vitro production of this virus would be desirable, it has proven difficult to maintain it continuously in an H. zea cell line. Recently we have found that the H. zea SEV, maintained for a long time by serial passages in vitro, continued to produce polyhedra (Yamada et al., in press).

In this paper we characterize biologically the H. zea SEV obtained by serial passages in vitro. The H. zea (IPLB-1075) cell line (Goodwin, 1975) was employed. Non-occluded virus which we released into the supernatant fluid over infected cells provided the inoculum for the serial passages. The cells from each passage level were pelleted by centrifugation at 1,200 x g for 20 min. PIBs were released by treatment of the pellet with 0.25% trypsin for 2 hours at 37°C, harvested by centrifugation at 1,200 x g for 20 min, and counted in a hemocytometer.

First instar H. zea larvae and the artificial diet obtained from Dr. J. D. HOFFMAN, U. S. Department of Agriculture, Columbia, Missouri, U.S.A., were used for the in vivo infectivity assay. Feeding tests were performed by adding appropriate dilutions of infectious material onto 1 cm\(^2\) H. zea diet disks. Such diet disks were then fed to 30 second-instar H. zea larvae individually reared in Petri dishes. After 24-48 hours, healthy larvae that had eaten at least 80% of the treated disk were transferred to standard diet and incubated for a further 14 days at room temperature of about 20°C.

PIBs from cells infected with supernatant from passages 6 and 56 were purified in preparation for in vivo infectivity testing. Infected cells from these passages were fixed in the monolayer with 2% glutaraldehyde and postfixed with 3% osmium tetroxide. The cells were then removed, pelleted and dehydrated in acetone before being embedded in Spurr’s medium. Ultrathin sections were observed in a JEM 120 at 80 KV. Virus from both early and late passages revealed the presence of singly embedded virions in the PIBs. This was a good indication of the homogeneity of the virus type used in the serial passage experiments.

Table 1 provides the results of per os administration of early and late passage PIBs to H. zea

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