

HETEROPTERAN SYMBIONTS: RECENT ADVANCES AND PERSPECTIVES

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Symbiotic associations within insects and microorganisms are of great importance. In Heteroptera, symbionts can be found in the insect's lumen or within the gastric caeca. By now, caeca-associated symbionts are shown to be related with some insects of the families Plataspidae, Pentatomidae, Alydidae, Phyrrochoridae, Acanthosomatidae, Scutelleridae, Coreidae, and Parastrachiidae. Insects of the family Pentatomidae are pests of economically important crops worldwide. Due to advances on molecular biology, the relationship between pentatomid stink bugs and symbionts are been object of intensive studies. Caeca-associated symbionts are vertically transmitted through generations in an orally maner. First instar nymph's acquire the symbionts probing on the chorion surface of the eggs, smeared by the females, after it laid the eggs. Recently, it was shown that pentatomid insects carry a dominant symbiont in the gastric caeca. The symbionts are polyphyletic, divided within at least three groups of bacteria (i.e., plant pathogens (*Pantoea* sp.), facultative and obligatory intracellular symbionts). Scanning electron microscopy showed that the surface sterilization of egg masses may eliminate the microorganisms found on the surface of the chorion, but also it can remove some structures of the egg's surface. Surface sterilization of egg masses and high temperatures (30°C) eliminated caeca-associated symbionts of *Nezara viridulá*, but did not affect nymph's development. However, females originated from sterilized egg masses, when kept at low temperature (20°C), never lay eggs. Interestingly, for the species *Acrosternum hilare* and *Murgantia histrionica* it was showed that high temperature affects the symbiotic relationship, with concomitant reduction in insect fitness. On the other hand, nymphs of the species *A. hilare* and *Pellaea stictica* from surface sterilized eggs showed high mortality. Only a few nymphs turn to female, but never laid eggs. According to the results, the degree of mutualism of the association is variable within the pentatomid stink bugs. Several factors, such as environment and/or age of the association can explain the different levels of dependence. Future directions include the need to better understand the biology of insect-symbiont associations, as well as the consequences of local climate changes for the dynamics of these interactions.



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