

## Insect Biology — Session Summary

**Conveners: E.J. Donahaye and B.C. Longstaff**

The objective of this session was to provide a forum for biologists working on stored-product problems to present their work to their peers. The topic is necessarily a very broad one and we endeavoured to provide a theme to each of three sub-sessions. This task was made more difficult by the large number of papers offered, far more than the number of slots available for speakers. In the end, the decision was made to divide up the oral contributions into sessions dealing with: 1. physiology, behaviour and genetics; 2. host-resistance and regional issues; 3. population dynamics.

Tom Phillips, USDA-ARS/University of Wisconsin, gave us a keynote address on the state of the art in pheromone research that was both erudite and thoughtful. This is one of the major research thrusts in stored-product insect biology at the moment, and Tom steered us through past achievements in identification and synthesis of compounds for a variety of species and towards the current exploitation of this knowledge, particularly in the use of baited traps for survey, detection, and monitoring. Lastly, he considered the gaps in our knowledge and speculated on future developments in the area. In the field of monitoring, he singled out improvements in trap design and the need to come to grips with the problems associated with the interpretation of trap catches as areas requiring exploration. Although use of pheromones as possible agents for stored-product insect control has been suggested, the potential has yet to be realised. Among the other possible areas that might show progress, Tom highlighted the optimisation of mass trapping of males for population decrease, mating disruption, and the development of attracticides. The last of these has at least two potential applications in poison bait stations and integrated with a system for the dissemination of pathogens.

The topic of pheromones was again covered in different ways in the first of the regular sessions by Hussain et al. and Plarre, and also in the poster papers of Mayhew and Phillips and Phillips and Strand. Both of the oral presentations evoked considerable audience response of a very positive nature. Other behaviourally-oriented talks presented during this session were those of Pike et al., presented by Irene Gudrups, which dealt with the responses of *Prostephanus* and *Sitophilus zeamais* to food volatiles, and Trematerra and Pavan, which considered the role of ultrasound and chemicals in the courtship behaviour of certain moths. The poster paper of Wright and Cartledge dealt with the effect of food volume and photoperiod on the initiation of diapause in the warehouse beetle, whilst the oral presentation of Shaaya et al., on the hormonal control of female reproduction in *Plodia interpunctella*, provided an additional piece to the jigsaw puzzle that is insect development.

The increasing value of molecular biological techniques to the general biologist was highlighted in the poster papers of Field and Phillips and Hidayat et al. The former looked at the genetic variation in North American populations of *Rhyzopertha*, whilst the second investigated the value of molecular and morphological markers in discriminating between *Sitophilus oryzae* and *S. zeamais*. Nawrot et al. reviewed the function and composition of cuticular hydrocarbons in stored product insects.

In the second session, a number of papers, both oral and posters, dealt with issues associated with host-plant resistance. Caroline Moss described some of the problems associated with the measurement of resistance to *Acanthoscelides* in seeds of *Phaseolus vulgaris*, emphasising the importance of appropriate methodology. Peter Credland reinforced this theme with an erudite analysis of the difficulties of comparing data from different studies involving bruchids. He high-

lighted the need to develop an appropriate protocol for such bioassays. Three poster papers, those of Baskaran et al., Bosque-Perez et al., and Vowotor et al., also considered aspects of the host resistance issue.

The remaining papers in the second session dealt with topics that could be described as having regional interests. These included Moshe Calderon's description of a new host for the groundnut seed beetle in Israel, that of Guan et al., which considered the infestation of an edible fungus of medicinal value, and a survey of the stored product pest situation within Croatia by Kalinovic and Ivezic. Poster papers included David Rees' survey of Psocoptera in Australia and Wu's investigation of urban insect control in China.

The final session dealt with aspects of population dynamics. Of the three oral papers, Cieselska noted the influence of environmental conditions on population changes, whilst White and Bell used *Cryptolestes ferrugineus* to point out that population dynamics studies frequently fail to consider many of the inherent complexities in life-histories. Beckett et al. compared various demographic parameters in four of the major stored product pests, and illustrated the fact that each performs optimally under different conditions. They went on to discuss the implications of this for pest management, particularly with regard to developing aeration strategies. Amongst the posters, Haryadi and Fleurat-Lessard considered the factors affecting survival and development of *Sitophilus* in rice grain pericarp, while Weaver and Throne presented life-history data for *Sitotroga cerealella* developing in farm-stored maize. Weston considered the influence of planting and harvest dates on preharvest infestation of maize by *Sitotroga cerealella*.

Overall, we feel that, although some excellent papers were presented during these sessions, attendance and presumably interest in insect biology was rather lower than we would have anticipated. The explanation is not obvious but may reflect a commonly-held belief, particularly amongst administrators, that most of the major biological issues are well understood. Several of the papers presented here, notably those of Tom Phillips and Peter Credland, point out that this is clearly not the case and that there are indeed many fascinating and important biological issues requiring elucidation.

Finally, we would like to thank all of our speakers and authors for their participation and valued contributions.