active fungal growth, but it is not clear at this stage if the same component is responsible for the observed behavioural responses of each of the species studied. The fact that the timing of oviposition by *I. leucospoides* relative to that by *Sirex* is very different from that by the rhyssine species suggests that parasites respond to different chemical stimuli produced by the fungal infections at the different times, but the situation is made complex by the obvious difference in the chemical and physical properties of the trees. When *I. leucospoides* oviposition is taking place the tree as a whole and the oviposition drills of *Sirex* are characterized by high moisture and volatile oil contents. The rhyssines show a positive response to 2–3 week old *Amylostereum* cultured on basal media, but little response to infested billets until some 5 months after inoculation. At the time of their oviposition in trees, both wood moisture and volatile oil contents are usually much lower than at the time of oviposition by *I. leucospoides*, although pockets of high moisture content are associated with frass, recently deposited by well developed *Sirex* larvae. Furthermore, this frass is characterized by a relatively high nitrogen content. Gradients of moisture along larval galleries and within the wood permit different degrees of fungal growth and modify the concentration of the attractant released. Differences of these kinds could well modify the responses to the same fungal-produced material so as to produce the observed differences in the timing of oviposition.

Positive responses, similar to those obtained with *R. persuasoria* and *M. nortoni*, have been shown by females of *Rhyssa crevieri* (Prov.), *Megarhyssa greenei greenei* Vier. and *M. macrurus* (L.) which were received from eastern Canada during 1967. All other ichneumonid parasites attacking *Sirex* in the insectary have similar oviposition behaviour to that of the rhyssines tested and it is reasonable to assume that the fungus is also involved in their attraction. Similarly, the behaviour of *Ibalia ensiger* Nort. is identical with that of *I. leucospoides*.

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Sensitivity of Three Stored Product Insect Species exposed to Different Low Pressures

THE effect of low pressures on the mortality of stored product insects has been investigated by Back and Cotton[1] and by us[2]. The relative sensitivity of six stored product insects was determined and the possible use of low pressures for stored product insect control was considered. In a preliminary study on the effect of different low pressures on *Sitophilus oryzae* (L.)[3], the highest mortality was obtained when the insects were exposed to 5 cm of mercury for 8 h, while lower pressures resulted in lower mortality. We have recorded the sensitivity of two more species to different low pressures, and compared it with that of *S. oryzae*.

Low pressure measurements were taken in metal containers filled with grain, using a method described earlier[3]. *Sitophilus oryzae* (L.) (adults 2–3 days after emergence), *Callosobruchus maculatus* (F.) (adults 2–3 days after emergence) and *Trogoderma granarium* Everts (larvae 2·0–2·5 mm length) were exposed to the low pressures. The insects were taken from the stock of the controlled temperature culture room at 26° ± 1° C and 70 per cent ± 2 relative humidity. Different low pressures were obtained in each of the metal containers of 20 l. capacity containing 12 kg of imported 'Hard Red' winter wheat of 12 per cent M C. Fifty insects in 40 c.c. glass jars containing 1 g of wheat or chick peas (*Cicer arietinum*) were inserted at a depth of 5 cm below the surface layer of grain.

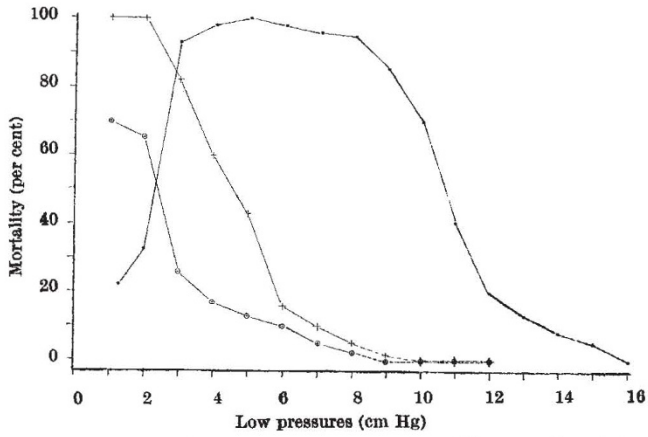

Fig. 1. Effect of low pressures on the mortality of three stored product insect species. ●—●, *Sitophilus oryzae* (L.) adults; + – · – +, *Callosobruchus maculatus* (F.) adults; ⊙ – – – ⊙, *Trogoderma granarium* Everts larvae.

The low pressures tested varied from 1 to 16 cm of mercury and the time of exposure was always 24 h. Treatment was carried out in the controlled temperature room and the mortality was checked 24 h after exposure.

The results are the average of four measurements and the percentages were modified according to Abbott's[4] formulae. The sensitivity of three insects to different low pressures is shown in Fig. 1. The curve for *S. oryzae* (L.) is clearly different from the other two. Very low pressures of 1 to 3 cm of mercury resulted in a lower percentage mortality of *S. oryzae* (L.), while the maximum effect was obtained with a range of 4 to 6 cm of mercury. With increased pressure, the percentage of mortality decreased, as expected. The mortality curves of the two other insects were very similar, showing the highest percentage of mortality at the lowest pressures and the decrease in mortality with the increase of the pressure. In the case of *T. granarium* Everts, the lowest pressure tested (1 cm of mercury for 24 h) did not result in total mortality. This finding confirms data already recorded[2].

The sensitivity of various insect species to different low pressures has not yet been investigated sufficiently. Exposure to the lowest pressures was thought to cause maximum mortality of the insects, but our results show that different insect species can react differently. Bhambhani[5], in his work on responses of pests to fumigation, noted that *S. oryzae* (L.) and *S. granarius* (L.) were less susceptible at 3–4 mm of mercury than at 2–4 cm of mercury. Sharplin and Bhambhani[6] found that when treating *S. granarius* (L.) the lowest pressures caused closure of the spiracular structure. We cannot offer any other explanation for our results. Further research is needed to investigate the effect of low pressures on insects with different morphological features.

These results may be important in considerations of low pressure treatment for insect control.

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