HOST SELECTION AND SEX ALLOCATION BY PACHYCREPOIDEUS VINDEMAE RONDANI (PTEROMALIDAE) AS A FACULTATIVE HYPERPARASITOID OF ASOBARA TABIDA NEES (BRACONIDAE; ALYSINAE) AND LEPTOPILINA HETEROTOMA (CYNIPOIDAE; EUCOILIDAE)

by

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SUMMARY
1) Pachycrepoideus vindemiae Rondami, a pupal parasitoid of Drosphila, accepts puparia containing any stage of the larval parasitoids Asobara tabida Nees and Leptopilina heterotoma (Thomson) in experiments in which it could choose between equal number of puparia containing uparasitized Drosophila pupae and puparia containing some stage of the larval parasitoids.
2) P. vindemiae does not accept all stages of the larval parasitoids equally: stages in which the offspring of P. vindemiae have a higher survival chance and stages which produce larger P. vindemiae are more readily accepted for oviposition than those in which survival chances are lower or hosts which produce smaller wasps, hence, the selective acceptance of larval parasitoids as hosts is functional.
3) Proportionally more male offspring emerged from low quality hosts. The data suggest that this is caused by allocation of more male producing eggs to hosts that represent a lower amount of resource rather than by differential mortality.

INTRODUCTION
Pachycrepoideus vindemiae Rondani, a pupal parasitoid known to attack many species of cyclorrhaphous flies. It occurs on all continents and is often reported from the field as a parasitoid of Drosophila spp. In Europe it has been found in France (Carton et al., in press), Great Britain (Baker, 1979), Italy (Nøstvik, 1954), Greece, The Netherlands, Spain and Switzerland (Van Alphen, unpublished). Details on its biology can be found in Crandell (1939) and Nøstvik (1954).

The parasitoid complex of fruit-inhabiting Drosophila in western Europe consists of the larval parasitoids Aphaereta scaptomyzae Fischer, Asobara tabida Nees, Leptopilina heterotoma (Thomson) and Tanycarpa punctata van Achterberg and of the pupal parasitoids Pachycrepoideus...
vindemiae Rondani, Spalangia erythromera Förster, Trichopria spec. and Trichomalopsis micropterus (Lindeman). Of these parasitoids, A. tabida, L. heterotoma and P. vindemiae are often found to attack the same host population and therefore may compete for the same hosts. VAN STRIEN-VAN LIEMPT (1983) has studied the interactions between A. tabida and L. heterotoma. In the study reported here we analysed the host selection behaviour of P. vindemiae as a facultative hyperparasitoid of these two larval parasitoids. CRANDELL (1929) reports P. vindemiae as a facultative hyperparasitoid because it was found to attack the pupae of Tachimid flies. BAKER (1979) showed that P. vindemiae attacked Drosophila puparia containing A. tabida and L. heterotoma by carefully examining the puparia found in his baits. The presence of mandibles and the darkening of the puparium gave evidence that a larval parasitoid had been present. The attack by P. vindemiae could be inferred from the presence of larvae, prepupae or pupae. When P. vindemiae had already emerged, the presence of mandibles of both the pupal and a larval parasitoid evidenced the multi- or hyperparasitism.

Though BAKER’s (1979) data show that P. vindemiae will sometimes oviposit in puparia containing some stage of a larval parasitoid in the field, they do not show under which circumstances the parasitoid will do so.

Because the conversion of Drosophila-biomass into larval parasitoid-biomass requires energy, hosts containing a larval parasitoid represent less food for the offspring of a P. vindemiae female than host puparia of the same size containing an unparasitized Drosophila pupa. Therefore it is likely that the former category will result in smaller P. vindemiae than the latter when used as host. It is often assumed that the fecundity of female parasitoids is positively correlated with their size (e.g. CHARNOV et al., 1981). If this is true for P. vindemiae, the parasitoid should allocate its eggs preferentially to puparia containing unparasitized Drosophila pupae when these are in excess available and refrain from oviposition in puparia containing a larval parasitoid. However, when the number of unparasitized host pupae is limiting, the best strategy should be to allocate male progeny to the host containing a larval parasitoid, because size presumably affects fitness less in males than it does in females (CHARNOV et al., 1981). Female progeny under these circumstances should preferentially be allocated to unparasitized pupae. In case the ratio of unparasitized pupae to puparia containing a larval parasitoid is lower than the optimal sex ratio under the prevailing conditions, the searching female should also allocate some female offspring to puparia containing a larval parasitoid. This depends on the number of females that exploits a certain patch. When a single female searches a patch, the best strategy is