Parasitism Associated with Brachypterous Males in the Sugarcane Leafhopper, *Perkinsiella vitiensis*[1,2]

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Samples of *Perkinsiella vitiensis* Kirkaldy, the Fijian sugarcane leafhopper, were collected at weekly intervals from cane fields in the mill area near Lautoka on the island of Viti Levu, Fiji, during 1965. Between January and early June the percentage of parasitized adult leafhoppers varied according to sex and form (Table 1). For the remainder of the year, the period that the leafhopper population had a low density, there was a small number of parasites. The population fluctuations of *P. vitiensis* in this area during 1965 were described by Osborn et al. (1966). The parasite, a strepsipteran, identified by pupal dissection,[4] was probably *Elenchus tenuicornis* Kirby. This species is the only strepsipteran parasite of *P. vitiensis* recorded by Box (1953). Macropterous females were the least affected group: only 0.8% were parasitized in comparison with 1.7% of the macropterous males. Brachypterous forms of both sexes were more heavily parasitized. The degree of parasitism for brachypterous insects is not significantly different from that of macropterous insects at the 5% level in a χ^2 test of the population of female polymorphs. In the same test applied to data on male polymorphs, significantly more brachypterous insects are found to be parasitized ($P<0.0001$). There is no significant difference between the numbers of parasitized adults and nymphs.

Brachypterous males may be more susceptible than macropterous males to parasitism and/or the parasitism of some male nymphs may result in the appearance of brachypterous forms at maturity, whether or not the parasite persists after the final molt of the host. If brachypterous males are more susceptible to parasitism, the increase in susceptibility may result from factors such as different behavior patterns, nutrition, variety of cane, proximity of parasites, or any combination of 2 or more such factors. Vevai (1942) found that under laboratory conditions the braconid *Aphidius matricariae* Haliday oviposited more readily in apterous than in alate adults of the green peach aphid, *Myzus persicae* (Sulzer). If the brachypterous state in sugarcane leafhoppers is induced in some males by parasitism, a similar alteration in the morphic development of some parasitized females may occur. The large number of apparently nonparasitized brachypterous females in the population may have masked the possible significance of a relationship between brachypterous forms and parasitism in this sex. In addition, a parasitized leafhopper often survives for some time after its male parasite has emerged. It is theoretically possible that some brachypterous adults were in fact parasitized during early nymphal instars, although they did not appear to have been. The presence of parasitized macropterous males and females in samples collected from the field may be the result of parasitism of adults or late-instar nymphs after morphic determination had occurred.

Table 1.—Field incidence of parasitism in the polymorphs of *P. vitiensis* from January to June 1965.

Form	*n*	No. parasitized
Brachypterous females	295	6
Macropterous females	1629	14
Brachypterous males	11	5
Macropterous males	1115	20
Nymphs	635	10

Wing development in certain aphids, particularly the black citrus aphid, *Toxoptera aurantii* (Fonscolombe), was thought (Kirkpatrick 1954) to be inhibited when it was parasitized by the cecidomyid *Pseudendaphis maculans* Barnes. Further evidence supporting the credibility of morphic alteration by parasitism is found in a paper by Johnson (1958) on the cowpea aphid, *Aphis craccivora* Koch, in which he stated that the extent to which alate structures are suppressed by *Lysiphlebus testaceipes* (Cresson), a hymenopterous parasite, depends upon the stage of development at which the aphids are parasitized. A similar reaction to parasitism was noted by Kennedy and Stroyan (1959) in the aphid *Dysaphis bonomii* (Hille Ris Lambers). There are therefore several tenable hypotheses which can explain the observed association, but until further studies are made it is not possible to state the exact nature of the relationship.

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