

## ARE FIG-WASPS HITCH-HIKERS? (1993)

BORNEO RESEARCH  
BULLETIN.

from

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A female chalcid wasp was found during routine ectoparasite examination in the fur of an adult male *Rattus hoffmanni* trapped in 1976 at Tomado, Lake Lindu, Central Sulawesi (elevation 1000m). A second wasp was taken from a juvenile *Rattus exulans* trapped in 1985 near Dumoga, North Sulawesi (elevation 240m). The wasp from North Sulawesi was deeply hidden in the rat's fur but became active when removed from the rat. The other specimen was probably similarly located since had it been in the superficial fur it would have been lost during handling of the captured animal. Initially, both wasps were thought to be *Ixodiphagus* parasitoids of ticks (Davis 1986) but were in fact the fig-wasp *Deilagaon chrysolepidis* Wiebes 1977 (Chalcidoidea : Agaonidae). This species is widely distributed in Indo-Australia and is a specific pollinator of *Ficus chrysolepis*.

We believe that the presence of fig-wasps in fur might indicate a phoretic association between the wasps and frugivorous mammals and hope that this communication will encourage those examining mammals for ectoparasites to look for, and report, wasps found in the fur of mammals.

Maintenance of the intricate symbiosis between fig-wasps (Chalcidoidea: Agaonidae) and the figs (*Ficus* spp., Moraceae) they pollinate (Wiebes, 1986) requires that, after leaving its natal tree, the fig-wasp is able to locate and reach trees of the same species carrying suitable fig-fruits (syconia). There is, as yet, no convincing efficient mechanism for this process among fig-wasps in forest habitats. Wind transport (Janzen, 1979; Ramierez, 1970) and chemical attraction (Galil, 1977) have been suggested but specific dispersal mechanisms have not been observed. Transport by mammals that range widely through the forest would greatly increase the area that could be searched by fig-wasps and the mechanism would be particularly efficient if the mammals were fruit-eating. One of the rats, *R. hoffmanni*, yielding a *D. chrysolepidis* is frugivorous and endemic to Sulawesi. The other, *R. exulans*, is an omnivorous commensal rat widespread in the Indo-Pacific Region (Musser, 1987).

We suspect that the *D. chrysolepidis* found in rat fur were probably released from syconia opened by the feeding rats or emerged from syconia close by. They then either became entangled in, or climbed onto, the rats' fur. Accidental entanglement seems unlikely even though, when fig-wasps are emerging, many thousands may be present in a tree. Fig-wasps usually emerge before the fruit ripens and falls to the ground. Frugivorous animals usually eat fully ripe figs, after the wasps have left the syconium (Ramirez, 1974), and rats tend to eat fruit on the ground. The wasps are also winged and active and could be expected to avoid entanglement by flying away.

Phoretic associations are frequent among insects (Clausen, 1976) including chalcid species. The phenomenon is seen particularly in species that rely on a resource that is rare or available only for a short time. Fig syconia suitable for wasp oviposition are an especially rare and ephemeral resource (Janzen, 1979). Most fig-wasp species, like *D. chrysolepidis*, are specific to a single fig species (Wiebes, 1979, 1982). Furthermore, populations of most fig species are widely dispersed. Individual trees fruit at different times and the fruit is suitable only for a short time. In a habitat with an unusually high density of fig trees a female wasp would find suitable syconia of the right species within about 700m (Janzen, 1979). In most habitats fig trees are at low densities and suitable fruits are even further away. Fig-wasps may be transported long distances by wind currents since they are found on islands (Ishii, 1934; Wolcott, 1951). However, such passive transport is undirected and may not lead a wasp to the correct host fig. Attraction of the wasp by a specific airborne chemical released by the host fig is assumed (Galil, 1977) by analogy with other Hymenoptera (Vinson, 1985). However, most fig species occur in humid forests with dense vegetation where advection is rare (Read, 1977) so that conditions are not conducive to the establishment of horizontal plumes of airborne odour which the insect could track over the distances required. Phoresy on active animals like rats would allow fig-wasps to cover large distances so increasing their probability of encountering figs bearing suitable fruit.

Interestingly, these records are not the only ones of fig-wasps in mammal fur. Grandi (1964) described the males of the fig-wasp *Ceratosolen aelleni* May from the fur of a fig-feeding African fruit bat.

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