

were handled ineptly in laboratory tests. The *Zacryptocerus* pushed at the aphids with their heads, seized and carried them briefly in their mandibles and then, invariably, broke contact and ran away. Not a single aphid was carried back into the nests. It is a remarkable fact that no solid food of any kind was ever seen to be carried into the nests, although the ants were presented with abundant quantities of diverse materials over a period of months. The ants are nevertheless strongly attracted to the tissues and haemolymph of freshly killed insects. This material they scrape, lick, and nibble away, swallowing all that they acquire and later regurgitating the liquid or semiliquid food to their nestmates. All of the insects offered in this manner were accepted: cockroaches, a nymphal chermid, two species of scarabaeid beetles, tachinid and muscid flies, a geometrid moth, and a variety of microlepidopteran moths. On four occasions workers were observed feeding on one of their own larvae. The workers prefer freshly killed insects to decomposed ones. Although fragments of insects in all stages of decomposition were available in the nest vicinity, and occasionally in abundance, foragers were seen to lick them on only two occasions, and then only for a few minutes. Honey and sugar water were avidly accepted by laboratory colonies. Also, natural honeydew was taken when leaves containing aphid colonies were placed near the nests. The possibility that *Zacryptocerus varians* feeds on pollen has not been adequately investigated. Workers offered pollen from tiger lilies (*Lilium tigrinum*) showed an interest in this material, but did not carry it into the nest or consume it, as do workers of *Z. rohweri* and *Z. texanus* when presented other species of pollen. It is conceivable that *Z. varians* will feed on certain kinds of pollen. But if it does, this item is not essential. In the laboratory, colonies flourish on a diet of fresh insects and honey. In the red mangrove forests of the Florida Keys, where pollen is very scarce during most of the year, *Z. varians* is one of the most abundant ants.

In short, *Z. varians* is a scavenger. The full extent of its diet can be worked out only by field studies, but it is clear that the species will accept a wide range of fresh insect materials. It appears to have surrendered all attempts at predation. This concession is in concert with its passive form of defensive behaviour, to be characterized later.

Methods

The colonies of *Z. varians* used in the present study were collected from dead stems of red mangrove in the central Florida Keys. They were forced to move into glass tubes 10 cm long with internal diameters of either 2 or 3 mm, plugged at one end with cork disks or cotton plugs and left open at the other end to permit the ants to forage outside. Each set of tubes containing a colony was placed on the floor of a glass finger bowl 20 cm in diameter and 8 cm deep, small enough to be fitted onto the stage of a dissecting microscope. As a consequence, the entire populations of the colonies, which contained less than one hundred adult individuals, could be monitored simultaneously. It was possible to record nearly all of the discrete behavioural acts of every member of the colony. During a period of 6 weeks, a total of 25.5 hr were devoted to two colonies and 2542 separate behavioural acts recorded. The observation hours ranged casually from 9.00 hours through the day and first part of the evening to past 24.00 hours; during this span of time no differences in level or patterns of activity were noted. The colonies were maintained on daily feedings of insect fragments and honey. Most observations were made at magnifications between 10 \times and 28 \times .

Voucher specimens have been deposited in the Museum of Comparative Zoology, Harvard University.

Results

The behavioural catalogue of the more intensively studied of the two colonies, incorporating the social ethogram, is presented in Table I. Thirty-eight categories of behavioural acts were recorded in the minor worker caste. When the frequency data (number of acts observed per category) were fitted to a lognormal Poisson distribution by the Fagen-Goldman method (see Fagen 1974), the total number of behavioural categories, including those still unseen, was estimated to be forty-two, with a 95 per cent confidence interval of [38, 46]. The catalogue of the second, less thoroughly studied colony did not differ significantly and will not be presented. In the following sections a more detailed account will be given of those traits in which *Zacryptocerus varians* differs from other ants, or at least most other ants. Then in the Discussion, the ecological, significance of these peculiarities will be considered.

Antennal tipping. This is the term I have applied (Wilson & Fagen 1974; Wilson 1975)