

In fact, no solid materials are brought into the nest.

**Abdominal trophallaxis.** So far as is known the behaviour now to be described is unique within the ants; it has not been observed even in *Cephalotes atratus*, the second member of the Cephalotini under intensive study (Mary Corn, personal communication). In abdominal trophallaxis the soliciting ant behaves in a fashion seemingly identical to that in oral trophallaxis, but the orientation is different: the worker holds her mouthparts precisely to the tip of the abdomen of the 'donor' ant (where the hindgut, ovaries and sting all exit), while licking the tip with her glossa and vigorously but lightly stroking the area immediately surrounding the tip with her antennal funiculi and occasionally her fore tarsi also. The behaviour is strongly different from ordinary allogrooming, in which the tip of the abdomen is licked only in passing as the allogroomer covers all parts of the abdomen. Also, in ordinary allogrooming the soliciting movements of the antennae and fore tarsi are never seen. Occasional workers display a 'hunger' for whatever material they receive from the abdominal tip; such individuals move from one nestmate to another while soliciting in the trophallactic manner. The attempts appear either to fail completely, in which case contact is broken off quickly, or to succeed sufficiently for contact to be sustained much longer. Thus five typical contacts timed between minor workers had the following durations: 1, 1, 1, 24 and 55 s. Four contacts in which minor workers approached major workers were timed as follows: 2, 2, 13 and 53 s. The donor ants often respond co-operatively to the touch of the solicitor, lifting the abdomen in the direction of the solicitor's head. Also, donors can occasionally be seen to 'call' solicitors by lifting the abdomen, extruding the anal or sting regions, or both. In one extreme example, a minor worker was observed to extrude its abdominal tip repeatedly over a period of at least 15 min, at intervals of about thirty seconds. First, the terminal five segments of the abdomen (those following the very large anterior segment of the gaster) were extended out slightly. Then the sting and anal tube were extruded, exposing the glistening membranes around these organs. No less than five other minor workers approached in succession during these episodes, antennating and licking the abdominal tip in the manner previously described.

What are the attractive materials? On several occasions I saw the solicitor ants licking what appeared to be a film of liquid at the abdominal tip, but I could not be sure. Also, there was no direct way of ascertaining the source of the attractant. Hence the provisional use of the imprecise expression abdominal trophallaxis is suggested rather than ovarian trophallaxis, anal trophallaxis, or whatever. Even so, some indirect evidence exists that the attractant may in fact be at least partly ovarian in origin. Workers are strongly attracted to the trophic eggs laid by nestmates, and they eat them on occasion, therefore competing with the larvae for this rich foodstuff. On one occasion, a minor worker was observed to lick the film of liquid remaining on the nest floor after a trophic egg had been laid and removed intact. Hence the surface fluids of the eggs are attractive. Still more significantly, a worker was observed to be solicited by two workers immediately after it had laid a trophic egg and while it was still feeding the egg to a larva.

In further support of the ovarian-attractant hypothesis is the fact that *Zacryptocerus* workers do not depend on nestmates to remove their anal material. Like other ants, the *Zacryptocerus* deposit faecal smears on the floor of the foraging area outside the nest. Neither their arboreal habits nor rigid body form has interfered with this basic function.

As stated, abdominal trophallaxis of the kind reported here does not appear to have been seen in other kinds of ants. *Myrmecia gulosa* workers sometimes solicit trophic eggs from one another, but not by direct begging from the abdomen. Freeland (1958) describes the process as follows: 'During winter, though larvae were not known to be fed with eggs, workers (except in the coldest weather) frequently solicited eggs from other workers and ate them: a worker would approach another and, placing its mandibles above those of the potential donor, begin plying its mandibular tips with the palps, simultaneously tapping or stroking it about the head with the antennae. The passive worker, after a variable period of such stimulation would begin flexing its gaster ventrally, more or less rhythmically, until it was curved well forward under the thorax. The egg material began to emerge and was taken, often before it completed its passage, by the soliciting worker, or sometimes by a third individual.' No solicitation of any kind was observed by the same author in *Myrmecia forceps*. However, a similar