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Some simple techniques helpful in ant research

Ewa J. Godzińska[1,2] and **Yvonick Leclerc**[2]

[1]Department of Neurophysiology, Nencki Institute of Experimental Biology, 3 Pasteur St., 02-093 Warsaw, Poland, [2]Laboratoire d'Ethologie et Sociobiologie, U.R.A. C.N.R.S. N667, Universite Paris Nord, Av. J.-B. Clement, F 93430 Villetaneuse, France

Abstract. Eight simple techniques which may be helpful in ant research are presented. They facilitate: (1) collecting ground-nesting ants; (2) prompting ants to go out of their nest chambers; (3) introducing ants into a test tube; (4) recapturing ants during their mass escape in the laboratory; (5) keeping tidy foraging areas of artificial ant nests; (6) keeping high level of air humidity in foraging areas of artificial ant nests; (7) providing ants with water of improved quality; (8) cleaning artificial ant nests carved in plaster of Paris.

Key words: ants, Formicidae, methods, collecting, rearing

Technical communication

INTRODUCTION

This report provides the description of eight simple techniques which we found helpful in collecting living ants and rearing them in the laboratory, and the discussion of their applicability for various ant species.

DESCRIPTION AND DISCUSSION OF PROPOSED NEW METHODS

1. How to collect quickly ground-nesting ants without taking with them too much soil

The simplest way to collect quickly a colony or a fragment of a colony of ground-nesting ants is to excavate them with a shovel or a spoon. Then, we can get rid of too much soil by placing the contents of the nest onto a sieve, and by tossing it gently. This method is particularly recommended for relatively large sand nesting ants. It should be employed preferably at low temperatures, when ants are less active. This technique bears some resemblance to the widely used method of collecting arthropods by means of the so called Berlese-Fullgren funnel (cf. Hölldobler and Wilson, 1990). That apparatus consists of a funnel topped by a wire-mesh screen onto which soil and litter are placed. As the material dries out, the ants and other arthropods fall or slide down the smooth funnel into a collecting bottle. However, in contrast to that, in our case it is the soil which falls down, and the ants which remain on the sieve.

2. How to prompt ants to go out of their nest chambers

To prompt the ants to emerge out of a ground nest, or out of a chamber of an artificial nest, we recommend to put a small piece of cotton soaked in peppermint-flavoured liquid in its entrance. This method proved to be particularly efficient in the case of Formica selysi Bondroit, Formica polyctena Först., and Formica pratensis Retz. The repellency of peppermint odour for the ants was demonstrated already by Hoagland (1931) and by Vowles (1964, 1965) in their studies of escape learning in Camponotus pennsylvanicus De Geer and Formica rufa L. In these experiments, peppermint odour was successfully used as a negative reinforcer.

3. How to introduce quickly a group of excited ants into a test tube

Test tubes provided with water supply at one end are often used as simple artificial nests to rear ants in laboratory (cf. Holldobler and Wilson, 1990). Empty test tubes are also useful as containers for collecting living ants in the field. However, introducing a large group of ants into a tube may be sometimes rather difficult and time-consuming, because excited ants tend to escape. One widely used solution to that problem is to anaesthetize the ants prior to their introducing into a tube by means of carbon dioxide, or by their cooling. However, such methods may increase their subsequent mortality. An alternative simple method of preventing the escape of the ants out of the tube into which they are introduced consists in repeated breathing against the inner surface of the open end of the tube to create a thin film of condensed vapour. The tube should be held vertically. Large ants (such as Formica or Cataglyphis) keep falling down towards the bottom of the tube each time they reach the limit of moistened glass. In contrast to that, smaller ants (such as Monomorium or Myrmica) are able to climb even moistened vertical glass. However, even in their case repeated breathing against the open end of the tube helps to keep them inside, because the individuals which approach top of the tube are being blown back to its bottom.

4. How to recapture quickly large numbers of ants during their mass escape in the laboratory

In the case of mass escape of ants kept in the laboratory, recapturing them one by one may be a too slow method to avoid important loss of quickly dispersing individuals. To recapture simultaneously large numbers of individuals, we recommend to sweep gently with a small piece of cotton the surface on which they are running. The ants tend to bite and to grip the cotton, and, thus, they can be lifted with it, and put together with it in a large bowl. After several minutes, the ants will loosen their grip of the cotton, and they can be then reintroduced into their nest. This method proved to be very efficient in the case of Camponotus abdominalis F., Ectatomma tuberculatum Olivier, Ectatomma ruidum Roger, Formica polyctena Först., Formica pratensis Retz., Messor sanctus For., and Pheidole pallidula Nyl. However, it is not recommended for Cataglyphis cursor Fonscolombe: these ants respond to tactile stimuli provided by the piece of cotton by even quicker running.

5. How to keep tidy foraging areas of artificial nests of some ant species

Some ants use empty test tubes put into their foraging areas as refuse dumps. It suffices then to take

away the tube filled with refuse and to replace it by an *empty one* to keep tidy the foraging area. This method worked particularly well with Camponotus abdominalis F. In contrast to that, Dinoponera quadriceps Santschi deposited only a small part of their refuse in tubes provided to them in their hunting grounds, and Ectatomma tuberculatum Olivier and Ectatomma ruidum Roger never used empty tubes put into their hunting grounds as refuse dumps.

6. How to keep high level of air humidity in foraging areas of artificial ant nests

Some ants, especially those living in the tropics, support better laboratory conditions if they are provided with high level air humidity not only in brood chambers of their artificial nests, but also in their foraging areas. To make it easier to keep moist the ambient air of the foraging area, Hölldobler and Wilson (1990) recommend to use closed plastic boxes as foraging areas for forest-dwelling ants. We recommend additionnally to place inside each foraging area several tubes filled with water and plugged with wet cotton. This technique is particularly recommended for tropical Ponerinae ants.

7. How to provide ants with water of improved quality

We recommend some caution in giving to ants water coming directly from the tap. We recommend to pour it rather into a large bowl, and to wait at least 24 hours before using it as drinking water for ants. The quality of such water is improved as a result of both the evaporation and the sedimentation of possible polluting factors.

Distilled water is not recommended as drinking water for the ants, as it is too poor in microelements. On the other hand, it may be used to assure the humidity in artificial ant nests carved in plaster of Paris, as its use helps to keep them free from mustiness.

8. How to clean artificial ant nests carved in plaster of Paris

Artificial ant nests carved in plaster in Paris may be washed in water, but they took a very long time to dry. Moreover, when too wet, plaster of Paris becomes soft, and the ants confined in such a nest may easily excavate in it galleries and escape. Hence, we recommend rather thorough drying of these nests, scrubbing them, and then exposing them to UV light in order to sterilize them. A nest cleaned in such a way may be safely reutilized, even to house ants of a different species.

DISCUSSION

The techniques recommended by us in the present report are all extremely simple; however, we found them very useful both in the field (methods 1-3), and in the laboratory (methods 2-8).

The techniques described in this report may seem to have little in common. However, they can be grouped into two main categories. Whereas the methods 1-5 are mostly time-saving, the methods 3-8 minimize the loss of captive ants by preventing their escape and by reducing their mortality.

We should like to stress that none of the techniques described in the present report can be recommended for ants in general, irrespective of the species. Whenever possible, we discussed the results obtained by us hitherto concerning their applicability for various ant species. We suggest strongly to carry out preliminary tests before applying any of them to a new ant species.

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