ARTIFICIAL DIET FOR REARING VARIOUS SPECIES OF ANTS[1,2]

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ABSTRACT

A diet consisting of agar, whole egg, honey, vitamins, and minerals was found to be satisfactory for rearing 28 species of ants representing 4 subfamilies of Formicidae.

For many years, workers have sought a convenient food for rearing ant colonies. A few diets have been successful for rearing a limited number of ant species, but most of the diets have had one or more drawbacks. Some deteriorated rapidly; others required much time to prepare. Hamburger, fried chicken, peanut butter, pieces of sugar cane, or honey are fed to ants routinely in many laboratories. Several researchers have depended upon a supply of live meal worms, especially *Tenebrio molitor* Linnaeus, or cockroaches of several species. Fielde (1904) recommended a variety of foods including honey or molasses, banana, apple, mashed walnut, and the muscular parts of insect larvae. Wheeler (1910) used a thick mixture of raw egg yolk, honey, and sugar, with an occasional feeding of hashed meal worms, or of the larvae and pupae of other ants. Andrews (1937) used earthworms, insects, and honey, but not in the form of a mixture. Forrest (1962) fed various materials such as bread dipped in honey, jam, hard-cooked egg yolk, and insects to several unrelated species of ants. Khan, Green, and Brazzel (1967) reared the imported fire ant, *Solenopsis saevissima richteri* Forel, on baby food (high meat dinner of pork or beef) along with more commonly used materials. For rearing carpenter ants, *Camponotus* spp., Carney (1970) preferred honey, egg white, butter, and meat meal, mixed and boiled with enough pectin to solidify the mixture.

To study the aggressive behavior of the imported fire ant, *Solenopsis saevissima richteri* Forel, toward native North Florida ants, a practical food was needed which would serve for rearing a large number of species of ants. An agar based diet appeared to have the best possibilities, and several combinations were investigated. The most successful diet consisted of 5 g of agar, 500 cc of water, 1 whole hen's egg, 62 cc of honey, and 1 vitamin-mineral capsule (McKesson Bexel, see Table 1 for composition). The agar was placed in 250 cc of water, heated to boiling, and allowed to cool to room temperature. The contents of the vitamin-mineral capsule, the honey, 250 cc of water, and the egg were blended with a Waring blender at 2,000 rpm for 3 min and folded into the agar. This was then poured into Petri dishes and allowed to solidify. The media was kept in the refrigerator and was cut into ¾ inch squares at feeding time.

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TABLE 1.—CONTENTS OF EACH VITAMIN-MINERAL CAPSULE (MCKESSON BEXEL) USED IN THE ARTIFICIAL DIET FOR REARING ANTS.

Vitamin A	25,000 U.S.P. Units
Vitamin D	1,250 U.S.P. Units
Thiamine Mononitrate (B_1)	7.5 mg
Riboflavin (B_2)	7.5 mg
Pyridoxine Hydrochloride (B_6)	1.0 mg
Cyanocobalamin (B_{12})	5.0 mg
Ascorbic Acid (C)	100.0 mg
Niacinamide	100.0 mg
Calcium Pantothenate	2.0 mg
Vitamin E (d-alpha Tocopheryl Acetate Concentrate)	3.0 IU
Iron (Dried Ferrous Sulphate 84 mg)	25.0 mg
Iodine (Potassium iodide)	0.10 mg
Copper (Copper Sulfate)	1.0 mg
Manganese (Manganese Sulfate)	1.0 mg
Magnesium (Magnesium Sulfate)	1.0 mg
Zinc (Zinc Sulfate)	0.5 mg
Potassium (Potassium Sulfate)	5.0 mg
Calcium (Di-Calcium Phosphate)	50.0 mg
Phosphorus (Di-Calcium Phosphate)	39.0 mg
Methylparaben (Preservative)	0.064%
Propylparaben (Preservative)	0.016%
Excipients, artificial color, and flavor	

The exact role of the vitamins or minerals in the diet is not known, but when the vitamin-mineral capsule was omitted in a series of trials, the resulting diet was definitely less satisfactory. For example, *Formica schaufussi dolosa* Wheeler did not mature winged forms on the diet when the vitamin-mineral capsule was omitted. Other sources and combinations of vitamins and minerals were investigated, among them, those used for pink bollworm diets by Vanderzant and Reiser (1956) and boll weevil diets by Vanderzant and Davich (1958). In every case, the resulting diets were less satisfactory.

Of 30 species of ants[3] maintained in the laboratory, only *Prenolepis imparis* (Say) and *Lasius neoniger* Emery failed to mature sexual forms when fed only on this diet. With 17 species, rearing on the agar diet was especially successful. Reproduction levels were far above those obtained on any other diet. These 17 ant species were:

Odontomachus ruginodis Wheeler
Pogonomyrmex badius (Latreille), Florida harvester ant
Pheidole bicarinata vinelandica Forel
Pheidole dentata Mayr
Pheidole morrisi Forel
Crematogaster minutissima Mayr

[3]Ant identifications verified by H. Denmark, Div. Plant Ind., Fla. Dep. Agr.

Crematogaster clara Mayr
Monomorium minimum (Buckley), little black ant
Monomorium pharaonis (Linnaeus), Pharaoh ant
Solenopsis geminata (Fabricius), fire ant
Solenopsis saevissima richteri Forel, imported fire ant
Solenopsis molesta (Say), thief ant
Cyphomyrmex rimosus minutus Mayr
Iridomyrmex pruinosus (Roger)
Conomyrma pyramicus flavus (McCook)
Camponotus pylartes fraxinicola M. R. Smith
Formica schaufussi dolosa Wheeler

Eight other species that were reared easily were:
Pseudomyrmex brunneus F. Smith
Pseudomyrmex pallidus (F. Smith)
Aphaenogaster rudis Emery
Crematogaster ashmeadi Mayr
Crematogaster atkinsoni Wheeler
Leptothorax curvisipinosus Mayr
Camponotus abdominalis floridanus (Buckley), Florida carpenter ant
Paratrechina (*Nylanderia*) sp.

Five species were reared on this diet only with difficulty. However, with proper care, sexual forms were obtained consistently. These species were:

Hypoponera opaciceps Mayr
Neivamyrmex opacithorax Emery
Pheidole metallescens Emery
Trachymyrmex septentrionalis (McCook)
Conomyrma pyramicus pyramicus Roger

In some cases, it was found useful to vary the consistency of the diet. *Crematogaster ashmeadi* Mayr took the diet most readily in a semi-dry form. *Pseudomyrmex brunneus* F. Smith and *P. pallidus* (F. Smith) accepted it more quickly in a semisolid form. *Formica schaufussi dolosa* accepted the diet more readily when it was somewhat mushy. So far as could be determined, the fungus-growing species *Cyphomyrmex rimosus minutus* Mayr and *Trachymyrmex septentrionalis* McCook did not feed on the media directly but used it as a substratum on which to grow the fungus, which is the natural food of these species. Under humid conditions, *Cyphomyrmex rimosus minutus* did not take the diet back to their nests but grew the fungus on the blocks of diet in place.

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