TENT-BUILDING HABITS OF ANTS.

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The short and interesting article in the November number of THE OTTAWA NATURALIST on "Ant Roads," by Mr. Charles Macnamara, induced me to believe that an account of some further habits of ants might be of interest, and this is my apology for giving a *résumé* of some observations which my friend, Dr. Marie Stopes made during a recent sojourn in Japan, and an account of which she published with my collaboration in the "*Memoirs of the Manchester Library and Philosophical Society*," *Vol.* 53, (*Memoir No.* 20, 1909), under the title "On the Tent-building Habits of the Ant, *Lasius niger*, Linn., in Japan."

Lasius niger is the common brown or black garden ant and has a world-wide distribution. It usually constructs underground galleries and passages, and frequently keeps or cultivates aphides for the sake of the "honey-dew" which is an excretory product of the alimentary canal and is much sought after by the ants for food. It is not, as is frequently supposed, secreted by the small horn-like posterior appendages of the ants known as the syphons. The ants, as it has been stated, sometimes take the aphid eggs into their nests to protect them from the frost. *L. niger*, to my mind, is rather like man in the development of its agricultural methods. In some regions they are in these respects less advanced than in other places. Some are mere savages and leave their "cows," the aphides, out in the open to take care of themselves, others take great pains to keep their live-stock under such conditions as to be free from all danger and to ensure a maximum amount of "honey dew" production—they are the up-to-date farmers, so to speak. I do not intend to enter the arena of the vexed question of whether these actions are due to intelligence or instinct on the part of the ants: that is not my object. I am simply giving facts; let those who will analyse the motive power of these activities.

So that we find that whereas certain ants are content to wander along their well-worn paths to the pasture fields where their aphid stock is herded, others more advanced in their agricultural development make shelters or "tents," as they have been called, for their insect herds; we have called them "cow-sheds."

As early as 1810 Huber described these structures which *L. niger* was accustomed to make. He found small spherical

tents on the Spurge. They were of the "carton" type, constructed of finely triturated wood and in these shelters the ants kept the plant-lice; they were thus protected from their enemies and also from the rain and strong sunlight. Forel, who has added so much to our knowledge of the lives of these insects, has described a number of different kinds of "cow-sheds" which several European species of *Lasius* constructed. A certain species, *L. brunneus*, constructs shelters made of detritus, that is, minute inorganic or mineral particles such as sand, etc., over large bark aphides. Certain species of *Myrmica* make earthen cells to enclose the aphides and these chambers communicate with the rest by means of covered galleries. Our greatest American authority on ants, Prof. W. M. Wheeler, informed me, when I was studying these interesting habits, that *Lasius niger* and its American varieties are in the habit of constructing shelters over plant-lice and mealy bugs, and he refers to this habit in his interesting paper on the habits of the tent-building ant, *Crematogaster lineolata*, Say. (in *Bull. Amer. Mus. Nat. Hist.*, *Vol.* 22, 1906). The common American variety, *L. niger* var. *americana*, occasionally builds detritus tents around the stems of plants.

The Japanese colonies of *Lasius niger* which Dr. Stopes discovered seemed to have reached the highest stage of agricultural development; even the ants seemed to be imbued with the Japanese spirit of progress! She discovered tents on the evergreen oak, *Ilex integra*, of a cylindrical shape, encircling the terminal portions of shoots arising from the stumps of a stem that had been cut down. These tents were of the detritus type and made of minute grains of black sand mixed with white fragments of broken shell—the trees were growing near the sea at Hayama. The whole twig, with the exceptions of the tips of the leaves, was enclosed in the detritus tent through which ran galleries swarming with ants. But these particular ants were not content to construct "cow-sheds" merely, but for their own comfort had built of the same detritus covered galleries which wound round the trunk of the tree and communicated with the nests which were underground, so that they could reach the "cow-sheds" in all weather. Other shelters which may have been the initial stages of the larger tents, were made by the ants by biting the undersides of the midribs of the leaves. This caused the leaves to become inrolled with their uppersides outwards and the spaces thus formed by the inrolling was filled with detritus to form chambers.

Ants appear to construct the two types of tents—the carton type made of fibrous material of a vegetable nature, and the detritus type made of inorganic material; both kinds of

material may be used by the same species to construct their "cow-sheds" or tents.

As we concluded in our memoir, "There is no doubt that this habit of building detritus and carton tents has developed for no other purpose than that of protecting the various species of aphides which are kept by the ants for the sake of their honey-like secretions. By the construction of such "cow-sheds" the aphides are able to continue sucking the juices of the plant and at the same time they are not only protected from their enemies, but also from alien ants. The protection from cold is also important, as Brandes (in 'Die Blattlaus und der Honigbau,' *Zeitschrift f. Natur wiss, vol.* 66, 1894), has found that aphides are most active during the warmer part of the day, so that in keeping these warm the ants would also be obtaining a large supply of the secretion from them. In addition to these explanations of the tent-building habits of ants, Wheeler also suggests that the tents may be to prevent the escape of the aphides to other plants or other parts of the same plant.

"The evolution of the forms of the tents which are found in the different genera of tent-building ants may have started with the small earthen cell covering a few aphides; this may have been constructed either on the stem or by filling the space formed by the inrolling of certain of the leaves. Further enlargement and elaboration would lead to the formation of a spherical or cylindrical tent having the stem as axis, and finally, to secure for themselves the greatest comfort and convenience, the ants would connect these tents either with the earth or with their subterranean nests by means of covered passages."

This great adaptability to its environment, the usage of the means at hand and variability of constructive power in a single species of insect such as *Lasius niger*, is of very great interest to the entomologist who becomes so accustomed to the fact of a certain species of insect making nests or structures of a particular and more or less fixed type, such as we find in the other social and solitary hymenoptera as the bees and wasps, and also in other orders of insects.

BOOK REVIEW.

FARM WEEDS OF CANADA.—By George H. Clark, B.S.A., and James Fletcher, LL.D., F.R.S.C., F.L.S., with illustrations by Norman Criddle: Second Edition. Revised and En-

Hewitt, C. Gordon. 1909. "Tent-Building Habits of Ants." *The Ottawa naturalist* 23(9), 168–170.

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