

ON THE VITAL POWERS OF ANTS.

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It is well known, that insects generally are highly endowed with vital powers for the maintenance of existence and the perpetuation of their species. The following facts may illustrate the ability of the Formicidæ to maintain life under most unfavorable conditions:—

1. *The Survival of Ants under Exposure to severe Cold.*—A portion of a formicary of *Formica Pennsylvanica*,¹ the Pennsylvania carpenter ant, was cut during the month of January last, from an oak bough on Brush Mountain, Blair Co., Pa. It was preserved by the wood-choppers and sent to me by Mr. Jas. W. Riddle, of Bell's Mills. The ants, as usual during winter, were torpid. A few of them were put in a bottle; the others remaining in the nest were placed out of doors, where they remained for two weeks exposed to the rigor of a mountain winter. When the formicary reached Philadelphia, it was placed in the cellar of the Academy for several days. Upon removing the wrappings and sawing the block into sections, the ants were found to have become active. A great number, several hundred, with a few larvæ were stowed away within this small space. As it was necessary to free the formicary of its contents, all the ants were knocked out, and deposited in the yard, to give them some chance for their lives. A few happened to drop upon the ice, which lay several inches thick upon the ground. Forty-eight hours afterward I found these ants alive. They were imbedded in the ice within the small depressions made by their animal heat. They moved about as soon as removed and became quite active when placed in the closed hand. I have had the opinion that many of these ants were destroyed by our severe winters; but the above facts, viz., the preservation of the entire contents of the formicary, and the power to endure unharmed forty-eight hours freezing upon ice, seem to indicate that most of these insects survive the winter, and enter upon the spring in unbroken community. The ants preserved in the bottle had amongst them the wingless or fertile queen, and have been

¹ *Camponotus Pennsylvanicus*, according to Mr. Norton's recent classification.

kept in a glass jar under observation. They become torpid at night, but thaw out again in the heat of the room, and are very active, cutting galleries in wood, and constructing galleries from particles of paper and other litter cut into pellets.

In connection with this, I will barely allude to observations made on the 12th of February, 1877, upon the winter habits of the Fallow ant, *Formica rufa*. The ants were found in the hills at temperatures varying from 30° to 34° (Fahr.). At 30 degrees, in the frozen portion of the cone of the formicary, they were active but sluggish. In the centre of the hill at a temperature of 34°, they were found active and lively. It would thus seem that these interesting creatures are also proof against the rigors of our mountain frosts, and the prolonged season of fasting which winter compels.

2. *The Ability of Ants to endure extreme Heat.*—While encamped last summer upon Brush Mt., studying the habits of the Fallow ant, my attention was called to the following fact: There had been placed upon the camp-fire a portion of a decayed stump, one end of which touched the top of the wall of flat stones which our servant had erected on two sides of the hearth. A large flat stone was laid across the angle of these walls. The servant having occasion to remove this stone found the under surface thickly covered with black ants. I was called to the spot, and found that a community of Pennsylvania ants (*F. Pennsylvanica*) had been established within the stump, a fact of course unknown when it was placed upon the fire. One end of the stump touched the wall, over which the ants, driven by the heat, had passed, and lodged upon the under surface of the stone. I did not take the temperature of the stone, but it may well be conceived that it was quite hot. The ants had clustered on the side toward the fire, which filled the hearth. I rescued the individuals still within the log. When the stone was dropped, the others straightway began to scamper off into the grass evidently unhurt, and not even inconvenienced by their severe baking.¹

Mr. E. T. Cresson recently placed in my hands a package of original MS. notes made by Dr. G. Linneecum upon the ants of Texas. I find in these a fact concerning the agricultural ant, *Myrmica molefaciens*, which shows something of the same sala-

¹ The incident is fully recorded in Proc. Am. Ent. Soc., Dec. 1876.

mander-like qualities upon the part of that insect. A community of agricultural ants was located near a blacksmith's shop, which had been in operation for five years. During all that period the smiths had built their fires for heating wagon tires, upon the pavement or flat mound of these ants. This occurred on an average as often as two or three times a week. Frequently as many as nine tires a day had been heated upon the mound. After five years of such experience, Dr. Lineceum records that he saw numbers of ants at work, cleaning out the entrance to their city, before the fire that had just been used for heating tires was entirely extinguished. They seemed to have learned all about fire, and knew how to work around and among the half extinguished coals without injury. At the expiration of the five years, the colony was not numerous, had perhaps suffered a decrease; but they had not been driven away, and showed every sign of strong determination still to "hold the fort."

3. *Ability to survive exposure under Water.*—Last summer (1876), I discovered near Marple, Delaware Co., Pa., a formicary of mason ants, apparently a variety of *F. rufa*, the Fallow ant. The nest was in the ground, the communication thereto being by a gallery opening directly upon the surface. I placed these ants for observation in an artificial formicarium which was insulated in a tub of water. One night the covering by which the formicarium was protected during bad weather was left off, or removed by some meddler. A heavy shower fell early in the evening. In the morning the formicary was flooded; the ants were dead. Dead and lying under five inches of water, mixed up with the mortar, which the rain had formed with the soil that composed the galleries. I poured out the water, and set the box in the sun with a forlorn hope that some of the ants might revive. At noon I chanced to open a paper box in which I had placed a dead female ant of the genus *Myrmica*, a jet black insect. It had fallen into the tub, where it had been floating for many hours apparently drowned. It was now crawling about the box alive. Thereupon I visited my dead Fallow ants, and found three of them moving about in the slush endeavoring to extricate themselves. Another was struggling out of the muddy sediment in the jar which formed the lower part of the formicary. In short, the greater part of the drowned ants proved themselves to be veritable Noachians and survived the flood.

I conclude, by giving another observation from the MS. notes of Mr. Lincecum. During protracted periods of dry weather the agricultural ant of Texas is frequently found in great numbers in the wells whither they had probably gone in pursuit of water. Being unused to such a novel position, they are unable to return, and fall into the water. Instead of succumbing individually to the threatened doom, they extemporize a most efficient life-raft by collecting and clinging together in floating masses as large as an orange. In this condition they are often drawn up in the bucket, and notwithstanding they may have been in the water a day or more, they are all found to be alive, although half drowned and barely able to move. According to Mr. Lincecum, this species of ant cannot survive longer than six minutes under water, so that the submerged portion of the globular mass must have perished within that period, if they are supposed to remain in the same relative position. Yet the ants are *all* alive! The ball must therefore have been caused to revolve in the water. Shall we account for this life-saving process by considering it simply an accident of the instinctive struggles of the insects to rise out of the water and reach and remain upon the surface of the mass; or, with the observer, shall we consider it the result of a united, properly directed and systematic motion of the disengaged limbs of the outer tier of ants occupying the submerged portion of the revolving mass? The former theory seems sufficient to explain the phenomenon, but the wonderful intelligence of hymenopterous insects makes the latter opinion at least quite plausible. In either case we have another example of the high endowments of the *Formicidæ* to maintain and perpetuate their race through the severest struggles for life.

