

NOTES

NOTES ON THE BEHAVIOR OF CERTAIN SOLITARY BEES

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*Colletes compactus*¹

The September afternoon was bright and sultry, with a temperature of perhaps 85°, as we trudged up a deep little valley between heavily wooded hills, where a tiny brook ran away from a spring. As we stepped over the stream, the hum and blurr of swarming insects attracted us. There at the side of the water was a swarm of *Colletes* bees, perhaps two hundred in number, buzzing, flying, wheeling, dancing, weaving in and out, all in a chosen spot a few inches above the pebbles at the water's edge, and in an area about two feet across. The excitement was riotous, dancing and mating, dancing and mating. The males were far in excess of the females, apparently in about the proportion of three or four males to one female. The females were not so active as the males, but sat down more often upon the rocks as if in quiet and meek anticipation of attention. And usually they rested only a few seconds before their mates arrived, often from two to five males struggling together for the possession of one female. I am not sure whether the female's deliberation was of psychological or physiological causes; matings were not seen to take place on the wing, but she was of heavier build than the male and also was frequently laden with pollen; this may have hindered her participation in the merry dance. They were so intent upon their frolic that we could pick them up easily with the forceps, and our presence scarcely disturbed them; when we stepped into the very midst of the swarm they scattered a little—of necessity—but returned and concentrated on the same spot as soon as we removed ourselves.

¹ We are indebted to Mr. J. C. Crawford for the identification of the three species herein mentioned.

We could see no reason why this spot should be more agreeable to them than any other. Some lime had been thrown over the rocks at this point, but we could not see why this should attract them, since they paid it no heed. Other lime-dumps were near by, which did not attract them.

Calliopsis nebraskensis Cfd.

Some little solitary bees, *Calliopsis nebraskensis* Cfd., often busy themselves upon a bare spot in our field. They live in holes in the ground, and while they are solitary in habit they often exist in communities, i.e., several holes occur near together, but we have not ascertained whether this is because they prefer the community life, or whether merely the desirable features of the sunny bald spot has brought them near to each other.

These holes are always found closed and covered with a little mound of loose, well-pulverized earth. Not infrequently one sees this loose soil move, but evidently the occupant of the hole is only pushing up more dirt from below. Only rarely does one see her come tumbling out through the top of the mound, gather herself together and shake off the dust all in an instant, while the loose dirt again closes behind her, and dart off on the wing. It is a wise precaution that she keeps her nest always covered, for I have seen vandals prowling about these homes more often than I have seen the rightful owners. In fact, I long thought that these burrows and mounds actually belonged to certain tiny black-and-red wasps, who make very bold in the liberties they take about them.²

Now these little bees have one strange antic which has aroused our curiosity a number of times. First, one's attention is attracted to some little object buzzing around on the dusty ground, in the manner of an insect which has fallen upon its back and is struggling to get on its feet. It is a pair of these little bees, clasping each other by the legs, ventral to ventral, and with their bodies curved, so that the two united form almost a ring. Thus they continue buzzing and spinning and tumbling about on the dusty ground, whirling 'round and 'round in small circles near the same spot. In its intensity the struggle has much the appearances of a miniature dog-fight. I have never been so

² This was later identified as the parasitic bee *Specodes* sp. by Mr. S. A. Rohwer.

fortunate as to see the beginning of one of these performances, but they have continued for thirty seconds to a minute after discovery

At first we thought it was a mating performance, but later we found a pair in actual copulo, sitting quietly on the ground, the male surmounting the female with the abdomen curled underneath hers to effect the union. The duration of this mating was perhaps five minutes. But what the significance of this whirligig struggle may be we have not yet determined. At the conclusion of the performance they have always separated and instantly darted away with a buzz, so we have failed even to determine the sex of the performers. Is it a friendly or an antagonistic encounter, a sexual or merely social or platonic frolic? There may be some of the elements of courtship about it, but so far as we have seen it does not immediately precede or follow mating

Megachile brevis Say

We were plodding along the railroad track one hot, mid-July day, hunting for ground-wasps, when a little creature emerged from a crack in a tie at our feet and darted away on the wing. It was a little leaf-cutter bee, *Megachile brevis* Say. After one or two minutes we spied it returning, coming up the track from the east; it located its particular crevice without the least difficulty, entered, reappeared after a few moments and went off directly down the track to the east again. Soon she returned, coming straight along the track as before, and entered her hole without displaying the least confusion. This time she remained in for five minutes, and even a heavy train passing on the parallel track and shaking the earth perceptibly did not alarm her away.

When next she emerged she sailed directly west, with a dash. She flew with a characteristic gait, neither gliding nor zig-zag, but a combination of the two, like a boy on skates making a smooth, gliding stroke, first with one foot and then the other. She flew about twelve or fifteen inches above the ground, and kept pretty accurately to the same level. After ten minutes she reappeared, coming down the track between the rails, carrying her bit of green leaf, about one-half inch long. This time

she approached from the west (a new direction), and she betrayed extreme confusion, flying back and forth in the region of her tie and finally alighting on a weed near by to rest and readjust her burden and get a better grip upon it with her hind pairs of legs. At this point a train dashed by, passing over her very tie, shaking it violently, and causing her to disappear for seven minutes. Then we spied her up the track, hunting eagerly over another tie which had a wire over it, just like her own. Furthermore, she was searching over *only* the south end and west side of the ties (this was the location of her nest in her own tie); then she seemed to give it up and dashed off down the track to a few feet beyond her nest and resumed the searching, then gradually worked her way back, circling low over the south end of many ties until she came to her own which she recognized at once and wearily entered, carrying all the time her green leaf. After a four-minute rest she dashed off westward again, this time for a fifteen-minute journey. Upon her return she repeated exactly the performance of searching over the ties a little west, then east of her nest, and then working back to the middle position, where lay her nest. At each trip she brought her load of leaf. As she emerged from her crevice after five minutes we caught her and dug out her nest, a neat little pack of leaves about three-fourths inch long.

It seems to me that she was quick to make use of her newly-acquired knowledge that she could rely upon the rails as guidelines to her home, and not look to the right or the left of the track. She searched only in the two directions of a straight line, which is far simpler than to search in all directions of the compass, as her ancestors must have done. For is not this deliberate search on either side of her nest analagous to the flight of orientation, commonly seen in the homing of bees and wasps? Is it not, in fact, itself a flight of orientation so simplified and so deliberately executed that we are able to follow each movement?