

THE FAMILY HISTORY OF NICROPHORUS CONVERSATOR WALKER

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There does not appear to have been anything published on the habits of the stages of any Pacific Coast forms of the genus **Nicrophorus** Fab., hence even the very incomplete notes in this article may be worth recording. The data were secured in spare moments while the author was operating an Entomological Branch field station at Steelhead, a small settlement in the hills some 9 miles north of Mission, B. C.

The living accommodation at the camp was a two-roomed homesteader's cabin; the room containing the stove and "bed," had a ceiling of long cedar shakes, and during the exceedingly wet weather of late May and early June, the warm attic made an ideal home for numerous mice. Specimens were trapped rather continuously for several weeks, and those of May 25th-29th were placed on the ground under small boards in the clearing around the cabin. The intention was to attract some of the rarer **Carabidae**, but pairs of red-and-black burying-beetles responded more freely.

The species concerned is **Nicrophorus defodiens** Mannerheim, which according to Hatch (3) may be only the North American subspecies of the European **N. vespilloides** Herbst. Dr. Hatch has named seven aberrations (variations in colour pattern) of **defodiens**, and gives a key for these and five previously described variations, but I do not care to follow his disposition of the form **conversator** Walker, (5) since he is not in accordance with the original description. Hence I am considering all the specimens here reported on, as belonging to **conversator** Walk.

As previously mentioned, dead mice were placed under pieces of board, where they were soon discovered by the **Nicrophorus**. The beetles, (only a single pair was found associated with any one mouse) immediately proceeded to dig under the carcass, and to sink it below the surface of the ground. Next an almost spherical chamber was hollowed out around the body, giving the beetles sufficient space to move freely; the board formed the roof of this cell, and on removal left a perfect view of the interior. Unfortunately the actual burying process was not witnessed, but it seems reasonable to suppose that both parents took part in the work; though Furneaux (1) writing of the English **N. humator** Goeze, gives a rather idealistic description in which the males alone undertake the digging operations.

Once the cell was finished, the beetles proceeded to remove all hair from the mouse; this was done very thoroughly. The body was then compressed into an egg-shaped form, with the head, legs and tail so

completely moulded in that no one organ was discernible. It is possible that while denuding the carcass, and later fashioning it into a compact mass, the beetles may apply a somewhat preservative saliva, for in all cases observed, the mouse flesh was still very fresh looking when the **Nicrophorus** larvae were as much as half grown; and this in one example was over three weeks after the animal had been killed.

The eggs were not seen, but larvae which obviously had only just emerged were found crawling over one meat ball on June 21st. They soon gathered at the top and began to feed, gradually making a cup-shaped hollow; this depression deepened and widened steadily during the ensuing days, as the larvae rapidly increased in size. And it was at this time that a most interesting fact was noted; the parent beetles, instead of leaving when the carcass had been buried and the eggs laid, remained to guard their progeny! This is in absolute contradiction to Dr. Hatch's statement (2): "**The Nicrophorini** . . . have the habit of assembling in small numbers under small carcasses and, by removing the earth underneath the carcass, gradually cause it to become buried. Thereupon the eggs are laid, and the adults move on."

From the time that the cell had been completed, one of the beetles stood watch on top of the food supply, while the other crawled around lower down, carefully examining and re-examining all parts of the carcass. When the eggs had hatched and the larvae had begun to feed, the beetle on guard covered them most effectively, and reminded one strongly of a frightened hen and her brood of chicks. As the larvae grew and widened the depression in the meat, the parent had more trouble in straddling the cavity, until finally it became impossible and a position had to be taken on the side. At about this time the second beetle left the family, though in every case one stayed until the larvae were ready to pupate. It would seem very likely that one parent, probably the female, maintained guard at the top of the cell, while the male attended to the lower part, and was the first to leave. This idea was not verified, as there is practically no observable difference in the front tarsi of the two sexes of this species, and it was thought that an examination of the terminal abdominal segments of the live beetles might so upset them as to cause desertion of the brood.

There can be no doubt but that the object of the careful attention by the parent beetles is to prevent the development of other beetle larvae and of fly maggots. It is notable that no maggots were found in any of the carcasses used by **Nicrophorus**. And although small **Silphidae**, **Catops basillaris** Say, and **C. simplex** Say, simply swarmed around the dead mice, their larvae were unable to develop until those of the burying beetles were almost ready to leave. It is presumed that the **Nicrophorus** destroyed the immature stages of the **Catops** as fast as they appeared.

When fully grown the larvae entered the soil to pupate, but at some distance from their food supply. In each case a very definite path was made across the loose surface soil, from the rearing cell to the edge of the board, beyond which it very quickly faded out. This indicated that all the larvae left at the same point, and was verified on July 3rd, when one family was found "on the move." The larvae were half-way to the edge of the board, and one parent beetle was in attendance; but in addition to the path behind them there was a rough one in front, and this surely must have been made by the beetle. Such apparent foresight seems rather too much to expect of the clumsy-looking **Nicrophorus**, and the path in front of the larvae may have been accidental; another season's observations would clear the matter.

Just how far the larvae wander, and how deeply the pupal chambers are situated, is not known. One brood of 15 were removed when fully grown to a large jar of damp sandy soil, and all transformed and emerged successfully. Each larva made an oval pupal chamber, devoid of any silken lining, and with a smooth hardened inner surface. These cells were at depths of from three to seven inches below the surface, but digging to a greater depth all around the brood locations in the field did not disclose any pupal cells.

In a few cases dead mice were placed in empty jam tins sunk to their rims in the earth, and partially covered with pieces of old bark; pairs of **Nicrophorus conversator** Walk. soon took possession. Here again the mice were stripped of hair and consolidated into an oval mass; but the larvae did all their feeding at the lower surface, instead of hollowing out a cavity at the top. The large chamber and excess of light probably caused this change of habit. What occurs when a large carcass, such as that of a dog, is used by numerous pairs of the beetles, would be interesting to determine. Surprisingly little food is consumed by the larvae, relative to the size of the beetle which finally emerge. Fifteen young constitute an average brood, and this number attain full development on the body of one mouse, and even then leave an appreciable refuse pile.

The larvae feed entirely on dead flesh. Furneaux says that with **N. humator** Goetz, the beetles first gorge themselves on the carcass to be used, but this is not the case with the **N. conversator** Walk. studied. No evidence was found that the adults fed on the meat which they were preparing for their brood; in fact to the contrary. But this habit might vary with the quantity and nature of the food supply. Specimens were seen feeding on the dead bodies of the huge slugs so common in the damp coastal woods, but no attempts were made to bury these slugs for egg-laying purposes. The fifteen reared beetles were kept alive for three weeks on the very unnatural diet of fresh pork sausage, and were then killed purely for convenience sake.

Referring the reared specimens to Dr. Hatch's key to the aberrations of *N. defodiens* Mann., we find that of six males and nine females :

- 1 male and 3 females run to aberr. **nunenmacheri** Hatch.
- 3 males and 5 females run to aberr. **lateralis** Port.
- 2 males and 1 female run to aberr. **gaigei** Hatch.

With a good series the aberrations so intergrade that it becomes almost impossible to say whether the anterior fascia is continuous or broken, or to draw a line between "inner end of anterior fascia large" and "inner end of anterior fascia reduced." In fact the points of separation become so evanescent that it seems almost futile to attempt to segregate varying specimens in this manner. Divisions on clear-cut characters are desirable, but the naming of every phase of an extremely variable species is surely more suited to the study of genetics than to normal systematic entomology.

In conclusion, I would suggest that the stages of **Nicrophorus conversator** Walker are very hardy, easy to rear, and do not seem to have any parasites. The adults are, almost without exception, infested with a species of an active red mite, much like the **Gamasus coleoptratorum** so common on the English "Dor" beetles. These mites probably eat the filth sticking to the hairy undersides of the beetles, and they are often extremely numerous—328 were removed from one **conversator** adult. They do not seem to bother their unwitting coach-horses, and certainly must benefit by such a convenient means of wide dispersal. Schaupp (4), writing in 1881 of *N. tomentosus* Web., said "All the larvae were full of louse-like parasites, which seemingly did not do much injury to the larvae, but sucked out the pupae all of which shrunk and died. Of fifty larvae I obtained not a single imago." It is probable that the reference here is to a species of mite similar to that found on the beetles at Steelhead.

To any of the members of the Society who may feel inclined to study the habits of the several species of **Nicrophorus** present in B.C., I would urge very strongly that the larvae be watched carefully, and, when fully grown, be removed to a deep container filled with soil. This will save the investigator from having to dig up half an acre of ground during the hottest part of the summer.

Acknowledgments

I am indebted to the Dominion Entomological Branch for permission to use for this article the data secured while in their employment; to Dr. M. H. Hatch for copies of his publications; and most particularly to Messrs. Ralph and George Hopping for help in many ways, and on very many occasions.

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