

# The Entomologist's Record

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### The Myrmecophilous Lady-Bird, *Coccinella distincta*, Fald., its Life-history and Association with Ants.

(With two plates.)

By HORACE DONISTHORPE, F.Z.S., F.E.S., etc.

(Concluded from Vol. xxxi., p. 222.)

The most difficult problem in connection with *C. distincta* is to explain why it is always associated with ants. The beetles, as we have seen, do not as a rule hibernate in the nests; nor do the larvæ and pupæ live in the nests, nor are the eggs dropped on to them, as is the case with *Clythra quadripunctata*. The lady-birds (and their larvæ) will feed on any plant-lice and could often obtain a richer supply of food by visiting trees far away from the *rufa* nests, as do the ants themselves. Therefore it is not a question of food. It cannot be to obtain protection from the ants because its nearly the seven-spot lady-bird is much more common and occurs everywhere miles away from *F. rufa* nests. The fact that the latter sometimes occurs with *distincta* on the trees over *rufa* nests, and also alone in such situations—at Oxshott I frequently find *septempunctata* on fir trees over *rufa* nests, but have never been able to discover *distincta* there—serves to show the kind of variation in habit which may lead to a myrmecophilous mode of life, and not why it lives such a life. Wasmann<sup>35</sup> considers that *distincta* has adapted itself to such a life through a spontaneous variation, which embraced and retained, gave to the species a new direction in evolution, and this in spite of the limitation in food-supply which was incidentally brought about through this new habit. He believes that it has differentiated itself—not through, but in spite of the operation of natural selection—into a true morphological species. This again does not explain why it lives with ants, but only how the habit started; moreover I am more inclined to think that the habit was brought about gradually, by its ancestors experimenting in a myrmecophilous existence, as we see *septempunctata* doing at this day. [For other examples of a like nature—see my paper “On the Origin and Ancestral Form of Myrmecophilous Coleoptera.” *Trans. Ent. Soc. Lond.* 1909 413-29]. I consider the reason for its association with *F. rufa* is that it is a Müllerian mimic of *Clythra 4-punctata*. In 1900<sup>24</sup> I wrote of the latter—“I am inclined to think that this beetle is a mimic of *Coccinella distincta*, as it has a strong superficial

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resemblance to a 'lady-bird,' and the *Coccinellide* are known to be distasteful to insectivora." Again in 1901<sup>25</sup> I repeated this statement, but added—"At the same time *Clythra* may be distasteful on its own account, and thus provide an example of Müllerian mimicry, a question which I hope to settle this year." As mentioned in my paper on "The Life History of *Clythra quadri-punctata*, L." (*Trans. Ent. Soc. Lond.* 1902 11-23) I proved the *Clythra* to be distasteful by experiments with various birds, lizards, marmosettes, etc., at the Zoological Gardens. We therefore see that it is a case of Müllerian mimicry, and I now think that the *Coccinella* is a mimic of the *Clythra*, and not *vice versa* as I originally suggested. The *Clythra*'s eggs, larvæ, and pupæ occur in the ants' nests, and it is a commoner and more widely distributed species—it ranges from Sutherland in Scotland to Cornwall and the Isle of Wight. This suggests that the *Coccinella* is of comparatively more recent phylogenetic development; and it is also highly specialized as regards the male genitalia.

It has been suggested that as the shape of *C. distincta* is very different from that of *Clythra*, it can not be a mimic of the latter; but mimicry can be valuable in spite of differences in shape, furthermore that shape may be very stable and difficult to alter, as probably here, for it runs through many allied species. Everyone will agree that *C. distincta* is more like *Clythra* than is the common *C. 7-punctata*, as the shape is actually a little longer, and the spots much larger than in the latter. I have also been told that as the size of the spots varies in other species of *Coccinellidæ*—for example my subspecies *boreolitoralis* of the common eleven-spot Lady-bird, *C. undecimpunctata*, L., which occurs on the coasts in the north and west—these also ought to be mimics of *Clythra*. Variation occurs independently in different species and may produce the same results for different reasons, and one might just as well maintain that *C. distincta* ought to occur on sandy coasts! *Coccinella distincta* and *Clythra quadripunctata* are frequently found together on the trees over, and flying round the nests, and it must be admitted that by those who are not Entomologists, Coleopterists, or specialists, they might well be mistaken for each other.

My friend Professor W. M. Wheeler writes in one of his charming papers ["The Parasitic Aculeata, a Study in Evolution" *Proc. Amer. Phil. Soc.* 58 1-40 (1919)]—"There is undoubtedly much to be said in favour of the opinion commonly held by entomologists that the fruitfulness of their investigations is apt to be directly proportional to the intensity of their specialization, but it is also true that this very specialization may often preclude an adequate appreciation or even a recognition of phenomena that would profoundly impress the worker who possesses more general biological interests." This statement is not inapplicable to the subject in question.

Both species are distasteful, both exhibit warning colours, and it would be an advantage to the *Coccinella* to have shared any experimental tasting by young birds, etc., with the *Clythra*, which would help to protect it in the winter when birds are hungry and will sometimes eat insects they would not otherwise touch.

The *Clythra* dies off in the summer, whereas, as we have seen, the *Coccinella* passes the whole winter on the trees over the *rufa* nests.

If it be admitted that it is an advantage to the latter to resemble the former, then natural selection would have seized on any small

variations that arose, the larger size of the spots, etc., and gradually increased the same. I have submitted this part of my paper to my friend Professor Poulton and he considers that the above arguments are quite sound, but would not exclude the possibility of some additional advantage being gained by the selection of trees in the neighbourhood of the ants' nests, and therefore presumably visited more freely than others by the ants.

The life history of this insect may be briefly recapitulated as follows:—

*Coccinella distincta* passes its whole life in the immediate neighbourhood of ants' nests. Copulation takes place in May and June, and the female lays her eggs on the underside of pine needles, and leaves of trees, over the ants' nests. The eggs are long, bright yellow in colour, and arranged close together two and three abreast, varying in number from seven to some twenty odd. The eggs hatch in five to seven days, and the young larvæ feed on the Aphids on the trees on which they were born. There appear to be four moults, and the full-grown larva fastens itself up ready to pupate, having spent some twenty-five to twenty-nine days in the larval condition. It pupates in three to five days and about nine to eleven days elapse before the imago emerges from the pupal skin. The whole process lasting some forty to fifty days. The perfect insects feed on the plant lice on trees close to the nests, and the majority of them pass the winter on these trees; a few individuals only entering the nests for hibernation. Usually there is only one generation, but in some years, when the weather is favourable, there may be two.

Finally I consider the reason for its occurrence with *Formica rufa* is that it is a Müllerian mimic of *Clythra 4-punctata*.

#### EXPLANATION OF PLATE I.

1. Eggs of *Coccinella distincta* on pine-needle.
2. Pupa of *Coccinella distincta*.
3. Empty pupa case of *Coccinella distincta* on pine-needle.
4. top. *Coccinella distincta*, Fald., subsp. *labilis*, Muls.
4. middle. Form with spots 1 on elytra very small, showing a disposition to become effaced and approaching the type form *L. distincta*.
4. bottom. *Coccinella distincta*, Fald., subsp. *labilis*, Muls., ab. *domiduca*, Weise.

#### EXPLANATION OF PLATE II.

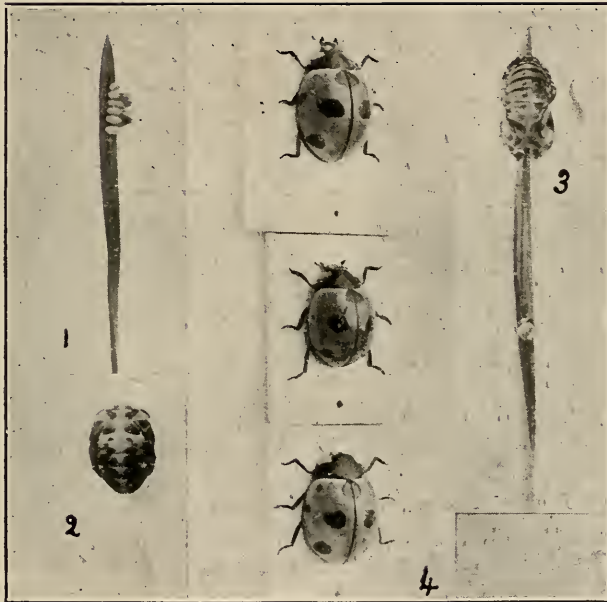
1. Small larva of *Coccinella distincta*.
2. Full sized larva of *Coccinella distincta*.
- 5 & 3. Male genitalia of *C. distincta* (5. median lobe, etc.; 3. tegmen, etc.).
- 6 & 4. Male genitalia of *C. septempunctata* (6. median lobe, etc.; 4. tegmen, etc.).

### Seasonal Polymorphism and Races of some European Grypocera and Rhopalocera.—Additional Notes.

By ROGER VERITY, M.D.

(Continued from page 201.)

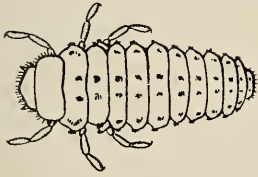
*Hesperia serratulæ*, Rbr., and *H. carthami*, Hüb. The races of the Sibillini Mountains in Central Italy do not seem to differ from the Alpine ones, judging by a comparison with those of the Baths of Valdieri, although the former locality is separated by such a distance from the Alps, and both the species are not known to occur in any other intermediate one.



COCCINELLA DISTINCTA, FALD.



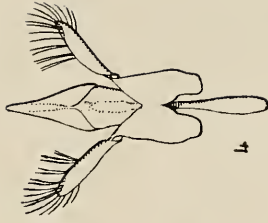
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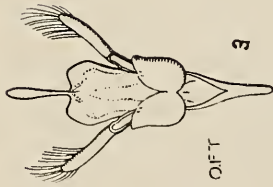
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O.F.T.

*COCCINELLA DISTINCTA*, FALLD.