

The Status of *Coccinella septempunctata* L. and its Varieties *divaricata* Oliv. and *confusa* Wied.

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A survey was recently undertaken by the author with Dr. V. P. Rao, Entomologist-in-charge, Indian Station, Commonwealth Institute of Biological Control, Bangalore, India, for natural enemies of *Adelges* spp. attacking silver fir (*Abies* spp.) and spruce (*Picea* spp.) in the North-West and Eastern Himalayas. In the course of this survey it was found that the coccinellids *Coccinella septempunctata* L., *C. septempunctata* L. var. *divaricata* Oliv. and *C. septempunctata* L. var. *confusa* Wied. were three of the most common predators of *Adelges* spp. in both these areas. With a view to sending laboratory-reared material to Canada for trial against *Adelges piceae* Ratz., which is a serious pest there, large numbers of these Coccinellids were collected in the fir and spruce forests to provide breeding material.

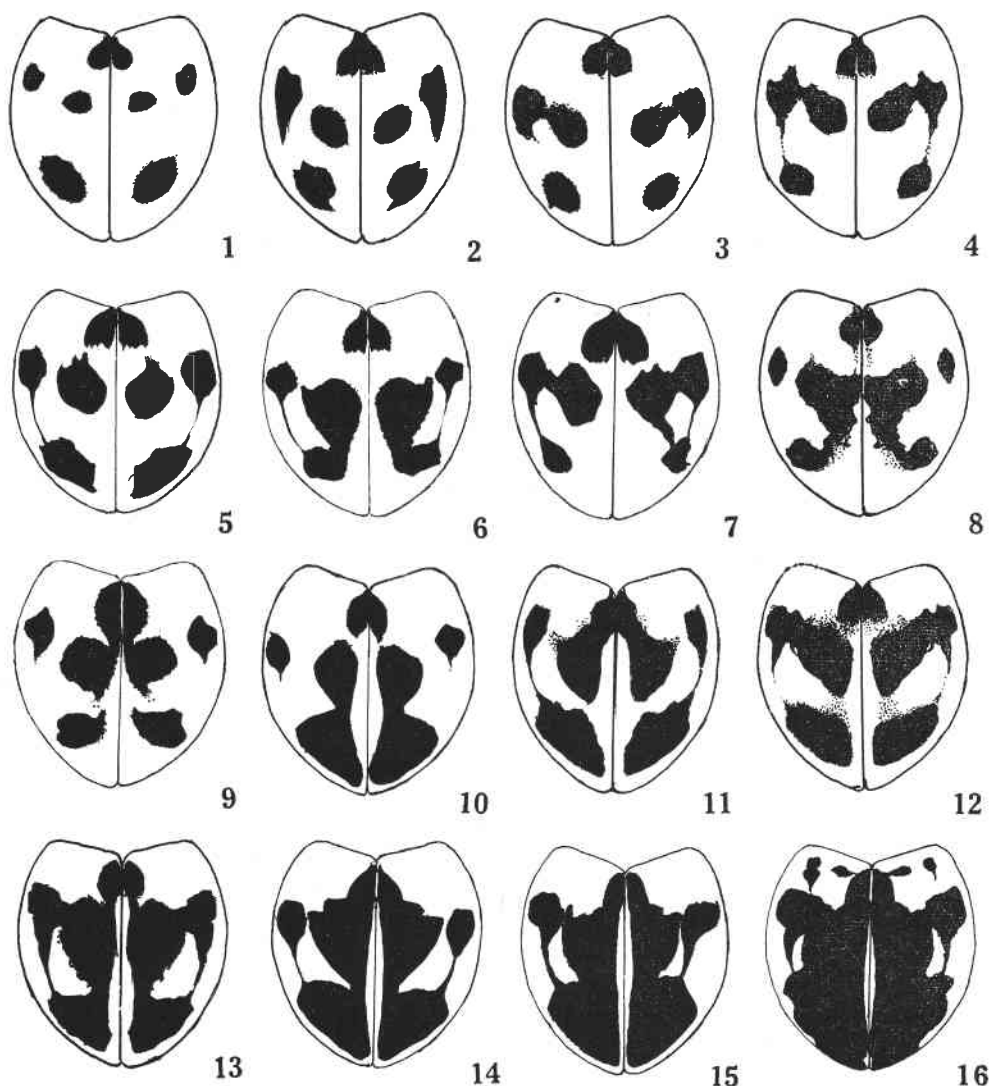
There has been considerable divergence of opinion regarding the identity of varieties of *C. septempunctata*, particularly the varieties *divaricata* Oliv. and *confusa* Wied. Mr. R. D. Pope of the Commonwealth Institute of Entomology in a personal communication writes as follows: "There has in the past been confusion over the identity of the insect described by Olivier (1808) as *Coccinella divaricata* and a major cause of the trouble proves on examination to be the arbitrary statement in 1903 by Weise that *C. distincta* Faldermann (1837) was previously described (1808) by Olivier as *C. divaricata* and that this insect was a good species which had been erroneously accepted as a variety of *C. septempunctata*. Authors seeing this note accepted its veracity without question and the Coleopterorum Catalogus (1931-2) was no exception".

"Mader (1936) took the trouble to examine the situation carefully, studying the figure given by Olivier of his *C. divaricata* as well as available material and the opinions of other authors. He came to the conclusion that Olivier had in fact described a variety of *C. septempunctata* as *C. divaricata* and that *C. distincta* was a good species, different from *C. septempunctata*".

"I have checked Mader's findings, examining the figures and descriptions given by both Olivier and Faldermann, and studying the other principal statements in the literature concerning the two taxa. This work, together with a thorough investigation of all the material available in our collections which has been assigned to *C. divaricata*, *C. distincta* and *C. septempunctata*, leaves me in no doubt that Mader was correct in disagreeing with the synonymy given by Weise in 1903".

He concludes: "As I see it the facts are these:

- (1) The good species, distinct from *C. septempunctata* and generally referred to as *C. divaricata* does exist. It is a species widely distributed in Europe and Siberia; it is the species known to be associated with the ant *Formica rufa* and is the species described for the first time in 1837 by Faldermann, who gave it the name of *C. distincta*.
- (2) The insect which Olivier described as *C. divaricata* (1808) is clearly identifiable from his illustration as a form, which as proven by the experiments carried out by the present author, comes within the limits of the species *C. septempunctata* and is simply a genetic variant of that species.



Figs. 1-16. 1, Elytral pattern of the typical *Coccinella septempunctata* L. 10, Elytral pattern of *C. septempunctata* var. *divaricata* Oliv. 12, Elytral pattern of *C. septempunctata* var. *confusa* Wied. 2-9, 11, and 13-16, Other elytral patterns commonly met with in the breeding experiments.

(3) This variant *C. septempunctata* var. *divaricata* seems to be common in North India and Assam, but occurs also westward through Asia Minor, Crete and other islands off Greece".

Regarding *C. septempunctata* var. *confusa*, Mr. Pope states that it was described by Wiedemann (1823) as a good species from Bengal. Mulsant (1850) regarded it as a variety of *C. divaricata*. From the description of Wiedemann's species, it appears to be another genetic variant of *C. septempunctata* and closely approaches the form indicated in Fig. 12 reared by the present author.

Although Varma (1954) described the evolution of colour pattern in *C. septempunctata* var. *divaricata* and mentioned that the varieties were descended from the typical *C. septempunctata*, he did not draw attention to the possibility

that the var. *divaricata* may be only a genetic variant. In the present work, in accordance with the belief that *C. septempunctata* var. *divaricata* and the var. *confusa* are two varieties of *C. septempunctata*, the typical *septempunctata* adults and the adults of the two so-called varieties were kept in separate cages for breeding. Oviposition took place satisfactorily, but the adult progeny obtained in both cases were found to be a mixture of the two varieties and the typical *C. septempunctata*. This gave rise to the suspicion that the varieties *divaricata* and *confusa* may not be varieties, but merely the extreme forms of a widely varying species.

In the laboratory at Bangalore large numbers of specimens of both *C. septempunctata* and its varieties were placed in the same cages under observation. Adequate food in the form of aphids attacking cabbage, viz., *Lipaphis pseudo-brassicae* Davis and *Myzus persicae* Sulzer was provided. Within a short time several copulating pairs were found, often the male being a *C. septempunctata* and the female a var. *divaricata* or var. *confusa* or vice versa. These copulating pairs were placed in separate cages for oviposition.

Large numbers of eggs were laid and adults were reared out from these. These progeny again were a mixture of *C. septempunctata* and the var. *divaricata* or var. *confusa*.

Larvae from the three sets of eggs were identical and genitalia preparations of the three types of adults showed no differences. Hence the varieties *divaricata* and *confusa* are only extreme forms of *C. septempunctata*, which is an extremely variable species with regard to elytral patterns. The results show that the names *divaricata* Oliv. and *confusa* Wied. apply to forms recurrent by genetic variation within populations of *C. septempunctata*. Figs. 1-6 show some of the commonest elytral patterns encountered in these breeding experiments in the laboratory.

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