A NOTE ON THE IDENTITY OF SOME SPECIES OF THE GENUS *BALLIA* (COLEOPTERA : COCCINELLIDAE)

By M. A. GHANI

(Pakistan Station, Commonwealth Institute of Biological Control)

CONSIDERABLE variation is known to occur in the elytral patterns in members of some genera of Coccinellidae, for example in *Coccinella* spp. and *Hippodamia* spp. (Smith, 1958).

Adults of the genus *Ballia* collected in 1959 from silver fir (*Abies pindrow* Royle) and blue pine (*Pinus excelsa* Wall.) in the Murree cantonment forests also showed great variation in their elytral patterns and coloration. Specimens were identified by the Commonwealth Institute of Entomology, London, and some were also determined by the Entomology Research Institute (Canada Department of Agriculture), Ottawa, as follows :

	Commonwealth Institute of Entomology	*Entomology Research Institute*
1.	*Ballia eucharis* Muls. (spotted)	*Ballia eucharis* Muls.
2.	*B. eucharis* Muls. (non-spotted)	
3.	*B. eucharis* Muls. var. *mayeti* Muls.	*B. eucharis* Muls.
4.	*B. dianae* Muls.	*B. dianae* Muls.
5.	*B. dianae* Muls. var. *zephirinae* Muls.	*B. zephirinae* Muls.
6.	*B. dianae* Muls. var. *gustavi* Muls.	*B. gustavi* Muls.
7.	*B. dianae* Muls. var.	*Ballia* sp.
8.	*B. christophori* Muls.	*B. christophori* Muls.
9.	*B. christophori* Muls. var.	
10.	*Ballia* sp. ? *bayaderae* Muls.	*Ballia*, probably *bayaderae* Muls.

All these species and varieties are shown in Plate I, figures 1–10. There were two types of individuals of *B. eucharis* : one was spotted, with brownish-yellow elytra and the other non-spotted, with light dirty-yellowish elytra.

Field-collected adults of each species or variety were carefully sorted out and bred individually in the laboratory. It was observed that the offspring of individual pairs did not all show the same characters as their parents but some of them had the appearance and characters of other species or varieties. The breeding records in which identities of species and varieties used are definitely known are given below. In each case a pair of the given species or variety was mated and the progeny derived from this mating given. The numbers 1–10 refer to the species and varieties given in the list above.

	Offspring										
Parent	1	2	3	4	5	6	7	8	9	10	Total
1	29	.	.	.	.	.	.	.	.	.	29
2	2	13	.	.	.	.	.	.	.	.	15
3	4	.	2	.	.	.	.	.	.	.	6
4	9	.	.	18	.	.	.	.	.	.	27
5	8	.	.	.	14	.	.	.	.	.	22
6	8	.	.	.	.	14	.	.	.	.	22
7	4	.	.	.	.	.	15	.	.	.	19
8	9	.	2	.	.	.	.	11	.	.	22
9	3	.	.	.	.	.	.	.	9	.	12
10	4	.	.	.	.	.	.	.	.	8	12
Total	80	13	4	18	14	14	15	11	9	8	186

This shows that the offspring of *B. eucharis* (spotted form) resembled the parents. There was, however, a good deal of variation in the number of black spots on the elytra. The progeny of *B. eucharis* (non-spotted form) consisted of both spotted and non-spotted individuals, with non-spotted predominating. In all the rest of the species and their varieties except *B. eucharis* var. *mayeti*, in which four of a total of six progeny produced were *B. eucharis* (spotted form), the majority of the offspring resembled their parents. However, all the species and their varieties invariably produced a number of individuals of typical *B. eucharis* (spotted form).

The progeny in these experiments usually comprised only two types of individuals, *i.e.* those similar to the parents and those of *B. eucharis*. However, with *B. christophori*, two out of 22 adult progeny bred were *B. eucharis* var. *mayeti*. With *B. dianae* var., one of the progeny was a form intermediate between *B. eucharis* and *B. dianae* var., and with *B. christophori* var. one had a whitish cross band on the elytra instead of the red of the parents.

The breeding of *Ballia* species and varieties was continued in the laboratory for two, and in certain cases three, generations, after which it had to be given up because of scarcity of suitable food. Variations similar to those recorded above were observed in this further breeding but quantitative data are not available. Field-collected individuals of *Ballia* sp. ? *bayaderae*, which were kept for breeding, had maroon elytra without any black spots, but in subsequent generations bred from these parents a number of individuals did develop black spots.

No difference was observed in the biology of the species and varieties studied. There was, however, some variation in size. No marked differences in their morphological characters, except for the elytral colour and patterns of the adult and slight variations in the coloration of the larvae, occurred.

The relevant synonymy, as given by Korschefsky (1932) is as follows:

Ballia bayaderae Mulsant, 1866, *Mon. Coccinell.*, p. 200 (*Neda*); Crotch, 1874, *Revis. Coccinell.*, p. 127.

Ballia christophori Mulsant, 1853, *Ann. Soc. Linn. Lyon* **1** : 164.

Ballia brahmae Mulsant, 1853, *t.c.*: 164; Crotch, 1874, *op. cit.*, p. 127.

Ballia dianae Mulsant, 1853, *t.c.* : 164, 295.

var. *gustavi* Mulsant, 1853, *t.c.*: 165; Crotch, 1874, *op. cit.*, p. 128.

var. *perplexa* Crotch, 1874, *op. cit.*, p. 128.

var. *saundersii* Crotch, 1874, *op. cit.*, p. 128.

var. *zephyrinae* Mulsant, 1866, *op. cit.*, p. 190; Crotch, 1874, *op. cit.*, p. 128.

Ballia eucharis Mulsant, 1853, *t.c.*: 167.

var. *mayeti* Mulsant, 1866, *op. cit.*, p. 189; Crotch, 1874, *op. cit.*, p. 127.

var. *montivaga* Mulsant, 1853, *t.c.* : 167; Crotch, 1874, *op. cit.*, p. 127.

var. *testacea* Mulsant, 1853, *t.c.*: 169; Crotch, 1874, *op. cit.*, p. 127.

The breeding experiments indicate that *B. dianae*, *B. christophori*, their varieties, and *Ballia* sp. ? *bayaderae* are not different species and varieties but are all various colour forms of a single species. The genetic mechanism involved was not studied, but the complex would be an interesting one for an investigation of this type. The author, as first reviser, selects *B. eucharis*, to the exclusion of the other names, to be the name used for this species, since that is the name now in more common usage than *B. christophori*, which has page priority. The distinctness of *B. bayaderae* remains uncertain.

Reference

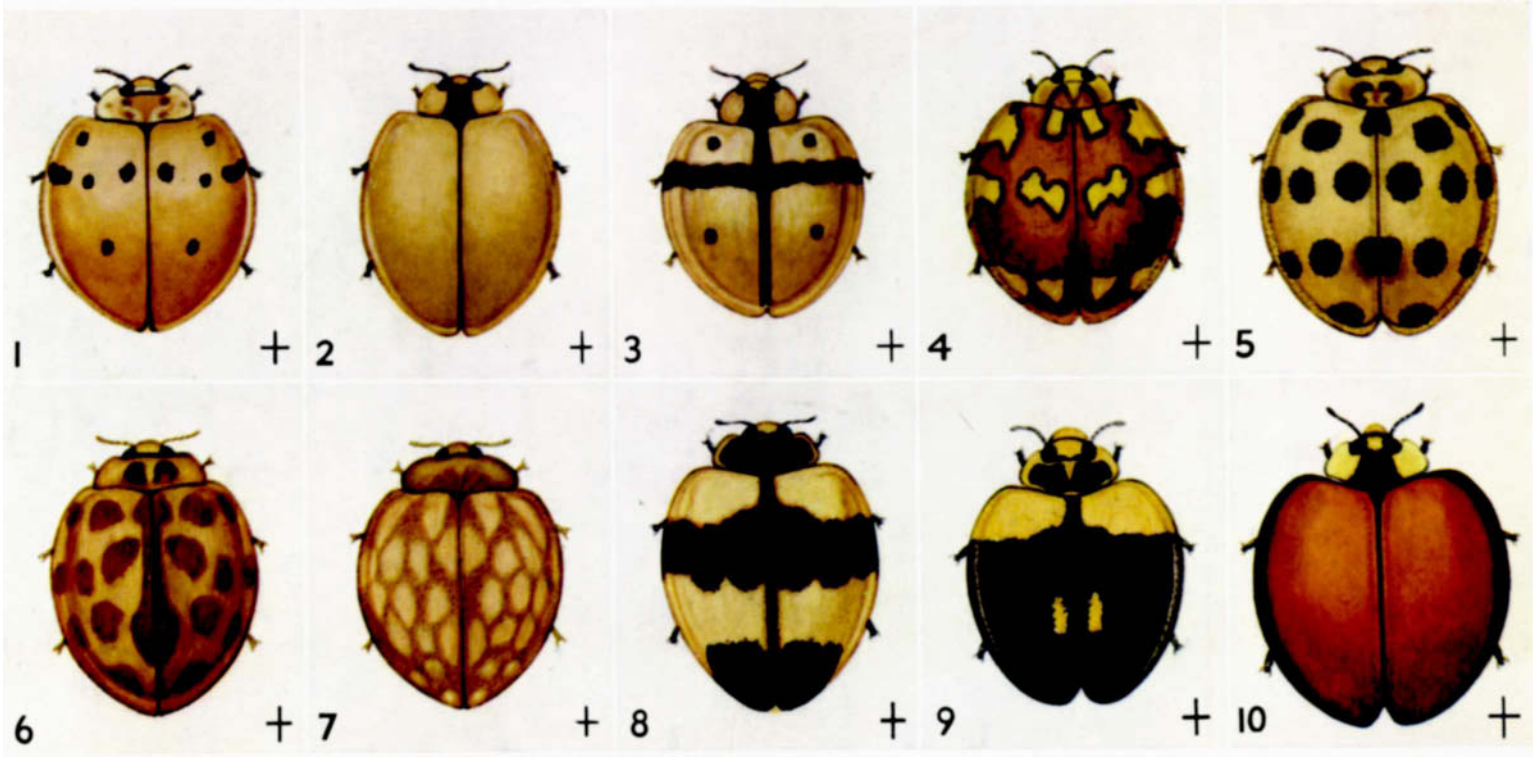
Korschefsky, R., 1932, *Coccinellidae*, *in* Junk, W., *Coleopterorum Catalogus* **120**, p. 278. *Berlin*.

Smith, B. C., 1958, Notes on relative abundance and variation in elytral patterns of some common coccinellids in the Belleville district (Coleoptera : Coccinellidae). *Rept. ent. Soc. Ontario* **88** : 59–60.

PLATE I

Colour forms of *Ballia eucharis*

FIG. 1.—*Ballia eucharis* Muls. (spotted).
FIG. 2.—*B. eucharis* (non-spotted).
FIG. 3.—*B. eucharis* var. *mayeti* Muls.
FIG. 4.—*B. "dianae"* Muls.
FIG. 5.—*B. "dianae* var. *zephirinae"* Muls.
FIG. 6.—*B. "dianae* var. *gustavi"* Muls.
FIG. 7.—*B. "dianae* var."
FIG. 8.—*B. "christophori"* Muls.
FIG. 9.—*B. "christophori* var."
FIG. 10.—*Ballia* sp. ? *bayaderae* Muls.



Colour forms of *Ballia eucharis*.

M. A. Ghani.