

THE EPILACHNINAE OF TAIWAN (Col.: Coccinellidae)

C. S. Li¹ and E. F. CookDEPARTMENT OF ENTOMOLOGY AND ECONOMIC ZOOLOGY
UNIVERSITY OF MINNESOTA, ST. PAUL, MINN.²

ABSTRACT

In this paper 3 genera and 30 species are recognized and described. These are, *Henosepilachna* n. gen.: *sparsa* (Herbst), *pusillanima* (Muls.), *wissmanni* (Muls.), *processa* (Ws.), *boisduvali* (Muls.), *vigintioctomaculata* (Motsch.), *semifasciata* (Dieke); *Epilachna*: *admirabilis* Cr., *maxima* (Ws.), *maculicollis* (Sic.), *flavicollis* (Thunb.), *sociolamina* n. sp., *incauta* (Muls.), *decemguttata* (Ws.), *longissima* (Dieke), *crassimala* n. sp., *microgenitalia* n. sp., *mushana* n. sp., *confusa* n. sp., *formosana* (Ws.), *chinensis* (Ws.), *sauteri* (Ws.), *lata* n. sp., *media* n. sp., *angusta* n. sp., *bifibra* n. sp., *mobilitertiae* n. sp., *gressitti* n. sp.; *Afidenta*: *mimetica* Dieke and *arisana* n. sp. Keys to subfamilies, genera, and species are included. Besides the new genus and 12 new species mentioned above, the genus *Afidenta*, *H. sparsa*, *H. pusillanima*, *H. boisduvali* and *E. flavicollis*, and *A. mimetica* are new records in Taiwan. Specimens of 13 of these species from mainland China, Australia, Burma, Ceylon, India, Indonesia, Japan, Korea, Malaya, Okinawa, Philippines, Sarawak, Siam and Sikkim are also considered. Seven species and 3 aberrations recorded by Korschefsky and Weise as occurring in Formosa and one species described by Dieke have been found to be misidentifications; 2 genera, 5 species, 6 subspecies, and 6 varieties have been discovered to be synonyms; one aberration and one variety have been elevated to species rank; and 2 species have been transferred to other genera. Most of these are not exclusively Formosan species but are generally distributed in Asia.

INTRODUCTION

The Epilachninae have long been of considerable entomological interest as the major plant-feeding Coccinellidae. Epilachninae may be considered as among the most economically important pests among beetles. For example, *H. sparsa* (Herbst), *H. chrysolina* (Fabricius), *H. vigintioctopunctata* (Fabricius), and the Mexican bean beetle (*E. varivestis* Mulsant) are well-known, serious pests in East Asia, Central Asia, Australia, and North America respectively. In Taiwan, both larvae and adults of some species of Epilachninae feed on the leaves of Solanaceae, Cucurbitaceae, and Urticaceae (the last are only injured by the adults). Among these three families, many cultivated plants such as tomato, eggplant, potato, cucumber, pumpkin, snake-gourd, tobacco, and ramie are damaged. Tomato and eggplant are often seriously infested by *H. sparsa*. The latter species has been previously misidentified as *H. vigintioctopunctata*.

1. Now Entomologist, Agric. Branch, Northern Territory Administration, Darwin, N. T., Australia.
2. Paper No. 4447 Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

The immature stages of this subfamily are not well known and descriptions of larvae are scarce (Kapur, 1950). This is owing partly to the fact that larval specimens seem to be but rarely preserved in collections.

The history of the study of this group in Taiwan is rather brief. *Epilachna nilgirica* var. *maculicollis* (Sicard) was the first Formosan Epilachninae to be described by Sicard (1912) from the collection of the Deutsches Entomologisches Museum in Berlin. Weise (1923) in his paper "H. Sauter's Formosa-Ausbeute: Coccinellidae" described nine species and two aberrations in two genera of Epilachninae (not including *E. nilgirica* var. *maculicollis*) (Sicard). Miwa (1931) in "A Systematic Catalogue of Formosan Coleoptera" listed 12 species and two varieties in two genera of Epilachninae, including three species and one variety which had not been described by Sicard or Weise. Korschefsky (1933) in a paper "Bemerkungen über Coccinelliden von Formosa" described eight species, one variety, and two aberrations in two genera of Epilachninae, including four species and one aberration which had not been recorded in Taiwan before. Miwa and Yoshida (1935) in their "Catalogue of Japanese Insects" listed 17 species, three varieties, and two aberrations in two genera of Epilachninae which included one aberration which had not been reported to occur in Formosa. Dieke (1947) in his paper "Lady beetles of the genus *Epilachna* (sens. lat.) in Asia, Europe, and Australia" described four species in two genera of Taiwan Epilachninae, including two new species. No further account of the subfamily as a whole has been published since.

Mulsant (1850), Crotch (1874), Weise (1898b, 1912, 1923), Mader (1926-1937), and Korschefsky (1933) have published extensively on the Epilachninae of Asia in general as well as on the subfamily in Taiwan. However, their works are based almost exclusively on coloration, spot pattern and size for species discrimination with almost no consideration of male genitalia or other anatomical characters. In the Epilachninae coloration and maculation are quite variable. The same species may have several different maculation patterns and vary widely in color. On the other hand, several different species may have the same coloration and maculation. The use, then, of coloration and maculation as a basis for distinguishing the species can only result in frequent erroneous interpretation. The subfamily has been in need of a general revision for a considerable time. This revision of Taiwan Epilachninae is a contribution toward a general revision of the Asiatic Epilachninae, since about one-half of the Chinese Epilachninae and about one-fifth of the Asiatic Epilachninae occur in Formosa. In this paper seven species and three aberrations recorded by Korschefsky and Weise as occurring in Taiwan have been found to be misidentifications; two genera, five species, six subspecies, and six varieties have been discovered to be synonyms; one aberration and one variety have been elevated to species rank; and two species have been transferred to other genera. Most of these are not exclusively Taiwan species but are generally distributed in Asia.

One of the serious problems confronting the student is that of nomenclature in the subfamily. There is considerable nomenclatorial confusion in the genus *Epilachna*, proposed in 1837 by Chevrolat. The genus was not described at that time but a list of species belonging to the genus was presented (among these species was *E. borealis* (Fabricius)). *E. borealis* was designated as the typical species of the genus *Epilachna* by Hope in 1840. Redtenbacher (1844) was the first to characterize the genus *Epilachna* with a description. Therefore, Redtenbacher was credited with being the author of the genus *Epilachna* by many authors. However, Chevrolat is the author of the genus *Epilachna* although he did

not present any description.

Weise (1898a), who erroneously recognized Redtenbacher as the author, proposed dividing the genus *Epilachna* into two genera. He retained the name *Epilachna* for those species having a basal tooth on their tarsal claws and proposed the name *Solanophila* for those species without such a basal tooth. After him, the name *Solanophila* was employed by many authors but was rejected by others since the presence or absence of the basal tooth is not a clear-cut character for the separation of the two named groups. For example, the type species of *Epilachna*, *E. borealis*, does not have a basal tooth on the tarsal claws. Dieke (1947) gives a detailed discussion of this problem. However, Dieke has considered that *Solanophila* is a synonym of *Epilachna* because the type species of *Epilachna*, *E. borealis*, on basis of its toothless claws can be placed with *Solanophila*. He states that "Besides the presence and absence of the tooth on the tarsal claws on which Weise based his separation exclusively, the species with toothed claws (with rare exceptions relegated to the genus *Afidenta*) have the sixth visible segment of the female divided longitudinally, while the species with toothless claws show usually no sign of such a separation. In order to change as little as possible in the present nomenclature, I shall adopt the division of the sixth segment of the female as the distinguishing character, which makes the toothed species congeneric with the type *borealis*, so that they will retain the name *Epilachna*. For the Eurasian species with undivided sixth female segment and toothless claws (equivalent to Weise's *Solanophila*), I propose the name *Afissa*." In addition to the genus *Afissa*, Dieke also separated two other new genera, *Afidenta* and *Epivotra*, from *Epilachna* and *Afissa*.

We have found that in the female, the sixth visible abdominal sternite (visible without dissection) of the type species, *E. borealis*, is entire, having only a median, longitudinal, lightly sclerotized area but not a split. (In *Afissa* Dieke, some species also have a median, longitudinal, lightly sclerotized area). In addition, the male genitalia of *E. borealis* and of *A. flavicollis* (Thunberg) (which is the type species of the genus *Afissa* and which was originally described by Thunberg from the Cape of Good Hope (*Capite bonae spei*), Africa in 1781, although many recent works do not mention the original type locality and some indicate the East Indies as the type locality) both have the typical structures of the genitalia of the group Dieke named *Afissa* in that there is no basal knife edge, no setae on the aedeagus, and the parameres have no apical thorn. We have available the type of *Afissa flavicollis* (Thunberg), which is a female, from Thunberg's original collection in the Zoologiska Institutionen, University of Uppsala, Uppsala, Sweden. The sixth visible abdominal sternite of the type is entire, having only a median, longitudinal, slight depression, and the tarsal claws have no basal tooth. The type of the type species is, therefore, congeneric with the type species of *Epilachna* and therefore, *Afissa* must be regarded as a junior synonym.

At first, it seemed to us that *Solanophila* might be still retained as a valid genus. Weise (1898a) did not designate a type species in the original paper in which *Solanophila* was described. He did, however, list and describe ten species from Kamerun, Africa and from these a type species may be selected. We have examined specimens of seven of the original ten species identified by Korschefsky from the Smithsonian Institution, Washington, D. C. Except for two specimens of *Epilachna* and *Afidenta* which were misidentified by Korschefsky as *Solanophila*, all the specimens agree completely with the original descriptions. Among them, four specimens of three species had been compared with types of

Korschefsky. All the females of five species (*S. gibbosa* Crotch, *S. monticola* Ws., *S. kratzi* Ws., and *S. harmala* Ws., and *S. dissepta* Ws.) have toothless claws and an undivided sixth visible abdominal sternite as in the type species of *Epilachna*, *E. borealis*. However, the male genitalia of the single specimen examined of *S. seria* Ws. (= *S. colorata* ab. *seria* Ws. according to Korschefsky) are different than those species which are congeneric with *E. borealis* in that *S. seria* has a basal knife edge, setae on the aedeagus, and an apical thorn. However, we shall select the first named species, *S. gibbosa*, of the original ten species included by Weise, as the type species of *Solanophila*. Then, *Epilachna* and *Solanophila* are identical as the types are clearly congeneric. Therefore, *Solanophila* and *Afissa* both are junior synonyms of *Epilachna*. The species with the undivided sixth visible abdominal sternite in the female, and the toothless claws shall be retained in *Epilachna* (equivalent to Weise's *Solanophila* or Dieke's *Afissa*) with the type species *E. borealis*.

There are numerous other species, however, that are quite distinct in major anatomical characteristics from *Epilachna*. These have a tooth on each claw, a divided sixth visible abdominal sternite in the female, and an apical thorn on the parameres, a basal knife edge and setae on the aedeagus in most of the male genitalia. This rather homogeneous group of species would seem to constitute a genus, and therefore, require a name. Dieke, of course recognized that such a group existed but owing to an erroneous interpretation of the anatomy of *E. borealis* applied the name *Epilachna* to the group. Weise also realized that there were two major genera here, but as he did not accept *E. borealis* as the type species, he applied the name *Solanophila* to the group containing that species and, thus, created a synonym automatically. Therefore, we propose the name *Henosepilachna* for this group and designate as the type species of the genus *H. sparsa* (Herbst).

In this paper three genera and 30 species have been described in the subfamily Epilachninae, of which one genus and 12 species are described as new and one genus and five species are described which are new records in Formosa. The new genus and new species described herein are to be attributed to the senior author.

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KEY TO TAIWAN SUBFAMILIES AND GENERA OF COCCINELLIDAE

1. Antennae inserted before, rather than between, anterior margins of compound eyes; mandibles with basal tooth, tip of mandible simple or bidentate. Carnivorous...
..... **Coccinellinae**
- Antennae inserted between, rather than before, anterior margins of compound eyes; mandibles without basal tooth, tip of mandible multidentate. Phytophagous.....
..... **Epilachninae**
- a. Tarsal claws with basal tooth..... b
- Tarsal claws without basal tooth..... **Epilachna**
- b. Sixth visible abdominal sternite of female longitudinally divided; yellowish setae present on upper edge of male aedeagus **Henosepilachna**
- Sixth visible abdominal sternite of female undivided; no yellowish setae on upper edge of male aedeagus..... **Afidenta**

Subfamily EPILACHNINAE Mulsant

For complete references up to 1932 see Korschefsky IN Junk, Coleopterorum Catalogus, Parts 118 and 120.

Upper side of body pubescent, punctuation uneven (but uniform in type species of genus *Epilachna*, *E. borealis* (Fabricius)). Antenna 11-segmented, with 3-segmented, loosely-articulated club; inserted between, rather than before, anterior margins of compound eyes. Mandible without basal tooth, tip of mandible multidentate. Last segment of maxillary palpus axe-shaped. Ligula conical or conical with a truncated apex. Metepisternum obliquely truncated anteriorly. Epipleuron horizontal, without (rarely with) cavities or grooves for reception of tips of middle and hind femora. Tarsal claws bifid, each with or without a basal tooth. Abdominal lines present, complete or subcomplete.

All known species are phytophagous.

Genus **Henosepilachna** Li, n. gen.

Type species: *H. sparsa* (Herbst).

Shape from oval to hemispherical. Length ♂ 7.7 (5.2-9.7) mm, ♀ 7.6 (4.9-9.9) mm. Coloration reddish yellow to brick red. Body pubescent on both dorsal and ventral sides.

Head: With fine punctures, spotless, or with a faint or obvious median black spot, or with an additional transverse black band along posterior margin of head. Eyes somewhat kidney-shaped, very slightly sinuate on inner edge. Labrum transverse. Mandible with an apical tooth and 2 lateral teeth, the former larger than the latter; apical tooth

from frontal view consisting of 3 teeth, with median tooth best developed; inner edge of mandible and teeth usually crenated. Maxilla with galea dilated, forming a broad, rounded apex; maxillary palpus well developed with large, axe-shaped, apical segment. Labrum with submentum transverse; mentum trapezoidal, narrow in front; ligula conical with obtuse apex; palpus small and short with segment 3 tapering to a point distally. Antenna inserted meso-cephalad of eyes, with last 3 segments forming a loosely articulated club.

Thorax: Pronotum with fine punctures, slightly convex, much narrower than base of elytra. Anterior margin deeply concave, lateral margin dilated and rounded, posterior margin almost round. Scutellum an equilateral or isosceles triangle. Basic pronotal maculation with 7 black spots arranged as in fig. 5. Basic pattern may be modified with some spots missing or smaller, or less distinct, or entirely spotless to having some spots enlarged and united (figs. 7, 9-21). In extreme cases, pronotum entirely black leaving only a narrow anterior and lateral margin light. Posternum narrow and short. Mesosternum slightly emarginate in front.

Elytron: Convex, rounded at humeral angle, with lateral margin subdilated and reflexed. Epipleuron horizontal, slightly concave, not distinctly extended to elytral apex. Apical angle of elytron rounded or forming a definite angle. Surface with coarse and fine punctures. Basic elytral maculation consisting of 6 black, persistent spots always present on each elytron arranged as in fig. 6; these may be modified by the presence of 1-8 black, nonpersistent spots which are variably present on each elytron even in specimens of the same species (fig. 15) or by enlargement and coalescence of some spots. Surface with pale yellowish pubescence, black on spots.

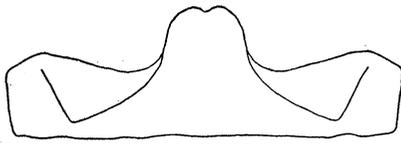
Legs: Tarsal claws bifid, inner claws slightly wider than outer, provided with a wide basal tooth.

Abdomen: Consists of 6 visible abdominal sternites with fine punctures. Abdominal lines complete³ or subcomplete, angulate or subangulate (figs. 1-2), reaching to about 1/5 to 1/10 of distance from apical margin to base of mesal part of 1st visible abdominal sternite⁴, somewhat variable within single species. Hind margin of visible abdominal sternite 5 truncate to concave in ♂, most often truncate and in some species having a median process in ♀. Visible abdominal sternite 6 subtruncate, or concave (fig. 3), or emarginate (fig. 4), or deeply emarginate in ♂, split longitudinally into 2 halves in ♀.

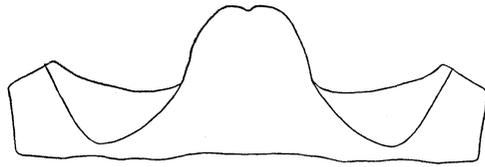
Male genitalia (figs. 22-24): Phallobase somewhat oval from dorsal view, with a longitudinal, dorsal median suture. Aedeagus most often fused to form a slender tube, with a longitudinal, ventral, median split; always curved dorsally near apical end. Upper side

3. The abdominal lines are termed complete if they form a complete arc from margin at one end to the margin at the other end of the first visible abdominal sternite (fig. 2). If the outer part does not quite reach the margin they are termed subcomplete (fig. 1). If the shape of the abdominal lines shows a somewhat definite angle they are called angulate.
4. That these measurements vary so widely for the same specimens from other authors is probably due to the use of different areas for measurement.

Figs. 1-21. *Henosepilachna*: 1, visible abdominal sternite 1 showing abdominal lines subcomplete, subterminal, and angulate; 2, visible abdominal sternite 1 showing abdominal lines complete, subterminal and subangulate; 3 visible abdominal sternite 6 of ♂ showing concave hind margin; 4, visible abdominal sternite 6 of ♂ showing emarginate hind margin; 5, dorsal view of pronotum, pronotal spots numbered; 6-21, spot patterns of pronotum and left elytron; 15, elytron, persistent spots numbered 1-6 and non-persistent spots a-h.



1 H. PUSILLANIMA



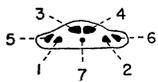
2 H. PROCESSA



3 H. SEMIFASCIATA



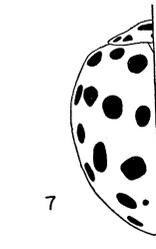
4 H. SPARSA



5 H. SPARSA



6



7

H. SPARSA



8



9

H. SPARSA



10

H. SPARSA



11



12

H. SPARSA



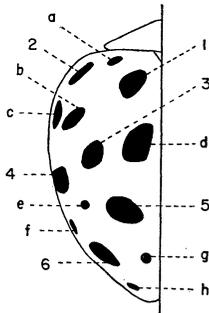
13

H. PUSILLANIMA



14

H. WISSMANNI



15

H. PROCESSA



16

H. PROCESSA



17

H. BOISDUVALI



18

H. 28-MACULATA



19

H. SEMIFASCIATA

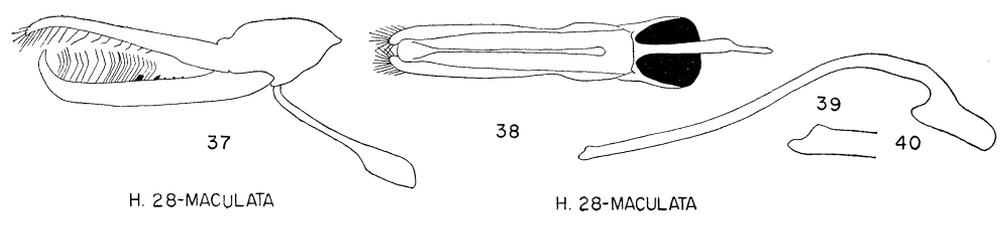
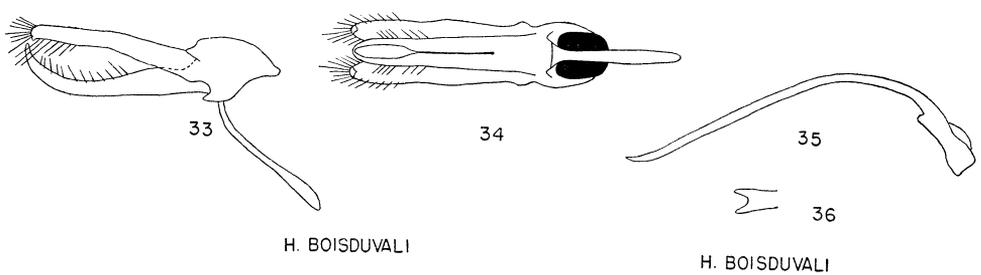
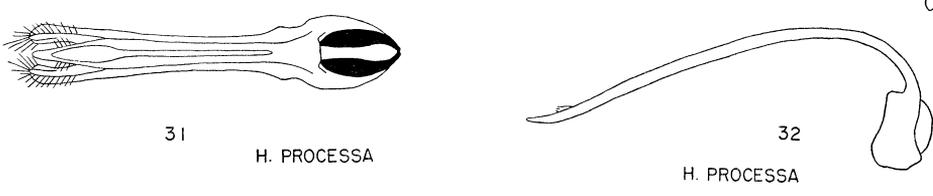
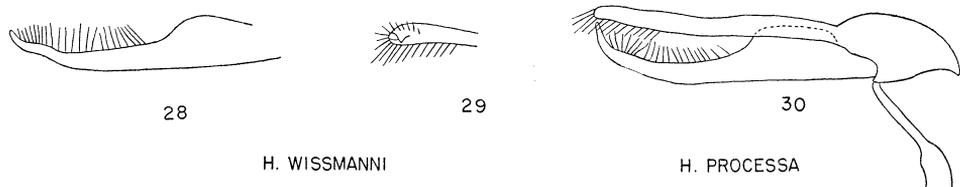
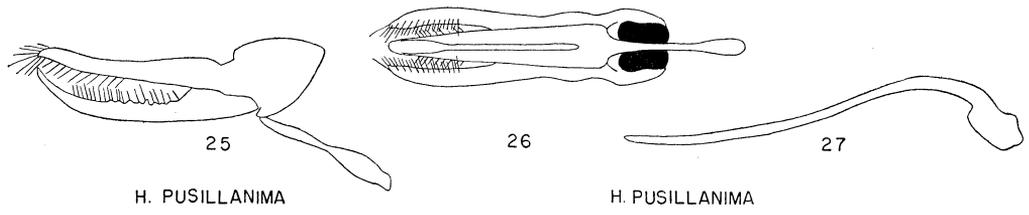
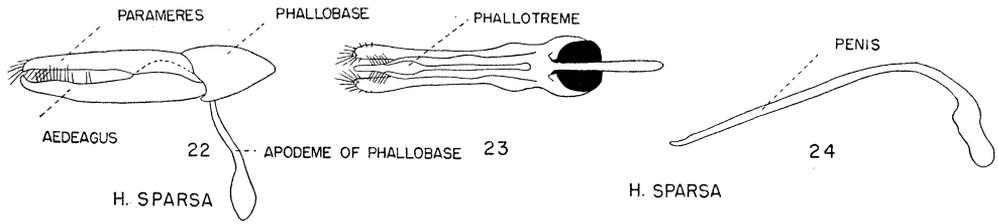


20

H. SEMIFASCIATA



21



of aedeagus with pale yellowish setae, basal knife edge⁵ present or absent. Paired parameres flattened and elongate, usually about same length as aedeagus, with 2 rows of pale yellowish setae at apical end and with apical thorn present, rarely absent; thorn sometimes represented by an apical ridge. Penis slender, with diameter much smaller than aedeagus. Penis usually curved near base. Apodeme of phallobase elongate, with distal end dilated and laterally compressed. *Female genitalia* (fig. 46): Hind margin of abdominal tergite pointed or convex. A pair of genital plates somewhat kidney-shaped, with a notch on 10 inner edge near base and a small stylus on apical edge.

KEY TO TAIWAN SPECIES OF HENOSEPILOACHNA

1. Tip of elytron rounded.....2
Tip of elytron with distinct angle..... 6
 - 2 (1). Elytral spot 3 transversely rectangular; often either spots 1 or 5 or both touching suture. Hind margin of visible abdominal sternite 6 of ♂ concave, split and widely separated by a deep notch in ♀. Part of ♀ genital plates visible through notch..... **semifasciata**
Elytral spot 3 not as above; visible abdominal sternite 6 of ♀ split but not widely separated..... 3
 - 3 (2). Elytra with 28 spots, 1, d, 5 and 9 close to or on suture with their counterparts on other elytron.....4
Elytra with 12 spots..... 5
 - 4 (3). Hind margin of visible abdominal sternite 5 of ♀ with a mesal depression. Visible abdominal sternite 6 of ♂ emarginate **vigintioctomaculata**
Hind margin of visible abdominal sternite 5 of ♀ without a mesal depression. Visible abdominal sternite 6 of ♂ subtruncate **pusillanima**
 - 5 (3). Sides of metasternum and often whole metasternum black. Hind margin of visible abdominal sternite 5 in both sexes subtruncate to slightly concave. Visible abdominal sternite 6 of ♂ subtruncate with slightly emargination.. **boisduvali**
Sides of metasternum black, never with whole metasternum black. Hind margin of visible abdominal sternite 5 of ♂ slightly concave; truncate, with a median process in ♀. Visible abdominal sternite 6 of ♂ subtruncate, no emargination..... **pusillanima**
 - 6 (1). Length of body more than 8.5 mm 7
Length of body less than 7.4 mm..... **sparsa**
 - 7 (6). Body broad, cordiform with thin pubescences on upper side, usually shining; in ♂, apex of each paramere with a pointed apical thorn, apex of penis without liplike process; in ♀, genital plate somewhat kidney-shaped and apex of abdominal tergite 10 pointed..... **wissmanni**
Body slightly elongate, cordiform with thick pubescence on upper side, resulting in a lusterless appearance; in ♂ apex of each paramere with a sharp
-
5. The basal knife edge is a very thin, knifelike ridge situated on the dorsal side of base of the aedeagus and between the proximal ends of parameres.

Figs. 22-40. *Henosepilachna*: 22, 25, 30, 33, 37, lateral view of ♂ genitalia, penis removed; 23, 26, 31, 34, 38, ventral view of ♂ genitalia; 24, 27, 32, 35, 39, lateral view of penis; 28, lateral view of aedeagus; 29, apex of one of parameres; 36, 40, tip of penis.

apical ridge instead of an apical thorn, apex of penis with a liplike process; in ♀, genital plate somewhat triangular and hind margin of abdominal tergite 10 slightly concave **processa**

Henosepilachna sparsa (Herbst) Figs. 4-12, 22-24, 44-45.

Coccinella sparsa Herbst, IN Fuessly, 1786, Archiv der Insectengeschichte 7-8: 160, pl. 43, fig. 11.

Coccinella vigintisexpunctata [sic] Boisduval, 1835 [fide Dieke], Voyage de decouvertes de l'Astrolabe—Faune entomologiques. Paris 2: 590.

Epilachna territa Mulsant, 1850 [fide Dieke], Spec. Coleopt. trimeres securipalpes. Paris, 787.

E. gradaria Muls. 1850 [fide Dieke], ibid., 789.

E. 28-punctata var. *sparsa*, Muls., 1850, ibid. p. 836.—Mader, 1926, 1937, Evidenz der Palaarktischen Coccinelliden, 35, pl. 1, fig. 35.

E. sparsa subsp. *sparsa* (Herbst), 1947, ibid., 32, fig. 10.

E. sparsa, Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 29, 37, figs. 8-18, 117, 181.

E. sparsa var. *bijuncta* Dieke, 1947, ibid., 38, fig. 17. **New Synonymy.**

E. sparsa var. *trijuncta* Dieke, 1947, ibid., 38, fig. 18. **New Synonymy.**

E. sparsa var. *gradaria* Mulsant, 1947, ibid., 33, fig. 8-9. **New Synonymy.**

E. sparsa subsp. *orientalis* Dieke, 1947, ibid., 34, fig. 12. **New Synonymy.**

E. sparsa orientalis var. *cinerea* Dieke, 1947, ibid., 35. **New Synonymy.**

E. sparsa subsp. *territa* Mulsant, Dieke, 1947, ibid., 35, figs. 13-14. **New Synonymy.**

E. sparsa subsp. *26-punctata*, Dieke, 1947, ibid., 36, fig. 15.

E. sparsa 26-punctata var. *nigrescens* Dieke, 1947, ibid., 37, fig. 16. **New Synonymy.**

Length: ♂ 5.6 (5.2-6.7) mm, ♀ 6.3 (4.9-7.4) mm.

Color and maculation (figs. 5-12): Upper side brownish or yellowish or brick red (one specimen from Kyoto, Japan, has entire upper side black; spots can still be recognized). Pronotum spotless to all 7 black spots present, usually 3-4 united. In a few specimens a spot is situated between vertex and frons, pronotal spots are more developed and occasionally 1+2+3+4 are united (in one specimen all 7 spots faintly united). Elytron may have only 6 black persistent spots arranged as in fig. 6. In addition, 1-8 black, non-persistent spots variably present. 4 is usually separated from elytral margin. Persistent and nonpersistent spots variable in size but former usually bigger than latter. Spots cb3d lie approximately on a straight line. In specimens not having 28 spots, 1 and 2 usually smallest, sometimes 1 or 5 enlarged and touching suture and 3+4 united (fig. 8); 1 sometimes removed farther forward; occasionally additional spots coalesce (i. e. 3+4+5, 3+4 and 5+6, 1+3+4 and 5+6 or 3+4+5+6 as in figs. 9, 10, 11, and 12 respectively); non-persistent spots cfh rarely joined to elytral margin. Ventral side and appendages pale brownish or pale yellowish or pale brick red, except tips of mandibles and hind corners or entire hind part of metasternum black. Sometimes faint black spots scattered on femora; mesal and lateral parts of abdomen or nearly whole abdomen black.

Elytron: Apical angle distinct. **Abdomen:** Abdominal lines subcomplete, reaching to about 1/6 to 1/10 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate or slightly concave in ♂; truncate or truncate with faint median process in ♀. Visible abdominal sternite 6 emarginate in ♂ (fig. 4), split in ♀.

Male genitalia (figs. 22–24): Aedeagus in profile 1.44 (1.30–1.56) mm long, gently bending dorsad at about apical 1/3, ending in an apical hook. Upper edge of aedeagus with pale yellowish setae on about apical 1/3; basal knife edge well developed. Parameres each 1.26 (1.14–1.37) mm long with apical thorn and with 2 rows of pale yellowish setae on about apical 1/3. Apex of penis with dorsal, elongate, oval, gonopore. *Female genitalia* (figs. 44–45): Apex of abdominal tergite 10 pointed. Genital plates each 0.49 (0.47–0.53) mm long, greatest width 0.36 (0.34–0.39) mm; with deep notch on inner edge about 1/3 from base. Both upper and under sides of notch with a sharp, dark edge toward apex not as distinct on upper side.

Type locality: East Indies.

Material examined: 127 specimens (60 ♂♂, and 67 ♀♀): *Taiwan*: Anping, Oct.; Fusho, Aug.; Giran, Oct. 1932, June 1933; Heito, May 1933; Hokuto, Taihoku, May 1940; June 1940; Hoppo, Oct. 1938; Horisha, May 1913; May–Aug. 1918; Kiraiko, May 1910; Koshun, April 1912; May 1912; April 1940; Kotosho, Mar.–April, 1920; June–July 1938; Kuaru, June 1937; Musha, May–June 1919; Taihoku, May 1933; Sept. 1933; April 1934; April 1937; May 1934; July 1932; June 1937; April 1940; May 1940; July 1940; May 1939; Taihorinsho, Aug.; Taipei, Nov. 1947; Tainan, Aug. 1923. *Mainland China*: Kiangsu Prov.; Hsuchowfu, June 1925; Woosung. Kwangtung Prov.; Keizan, Hainan I., Oct. 1942. *Australia*: Biloela, Queensland, April 1925. Flores: 1 ♂. *India*: 16 Km N of Tinsukia, Assam, Mar. 1944; Chabua, Assam, April 1944; Panjab and United Prov., June–Oct. *Japan*: Hakone; Hutyu, Tokyo, Aug. 1949; Kagoshima, Kyushu, July 1951; Kamino-mura, Kagawa, Sikoku, July 1948; Kitasirakawa, Sept. 1953; Kiyotaki, Moji, Kyushu, May 1938; July 1938; Kyoto, July 1952; Naze, Amami-Oshima, July 1932; Okayama, Okayama, Aug. 1948; Shiroyama, Kyushu, July 1932; Soraku-gun, Kyoto, June 1947; Tanahe, Osaka, Aug. 1947, Okinawa. *Java*: Tijibodas, alt. 1050 m, Aug. 1951. *Malaya*: Nam Heng, Johore, 1917. *Philippines*: Mindanao. *Sumatra*.

Remarks: Dieke (1947) divided this species into 4 subspecies with different geographical distributions as follows: *H. sparsa sparsa* (Herbst), *H. sparsa orientalis* (Dieke), *H. sparsa territa* (Mulsant) and *H. sparsa 26-punctata* (Boisduval). He states that "The differences in the genitalia that are found, such as the width of the bladelikey ridge on the upper side of the base of the penis⁶ or the exact shape of the profile of the penis, seem to vary gradually." We have found that a gradual variation in the width and the length of the basal knife edge (=the bladelikey ridge) of the aedeagus and in the exact shape of the aedeagus in profile also occurs in each of these subspecies. These seem to be individual variations and are not correlated with geographical distribution. Furthermore, the distribution of these forms overlaps: *H. sparsa sparsa* occurs in India, Indochina, and Formosa; *H. orientalis* in India, Indochina, and Taiwan; *H. sparsa 26-punctata* in Indochina and Malaya; and *H. sparsa territa* in Java. Mulsant (1850) reported that *H. sparsa 26-punctata* (Boisduval) occurs in Java. If *H. sparsa 26-punctata* and *H. 26-punctata* are actually synonyms (as Dieke indicates) *H. sparsa 26-punctata* should be also found in Java. Although the maculations of these forms are somewhat different, such differences are usually observed in different specimens of the same species in *Henosepilachna*. The absence of intergradient characters and of any true geographical separation between these forms, indicates that it is more reasonable to consider these as forms of a single highly variable

6. The structure Dieke called the penis is called the aedeagus in this paper.

species.

H. sparsa is quite variable in external appearance. This variation has resulted in a number of misidentifications in the past. In collections we have seen 18 specimens of this species under the names: *Epilachna 28-punctata*, *E. 28-punctata* var. ?, *E. 28-punctata* var. I, *E. 28-punctata* ab. ?, *E. indica*, *E. indica* ab. ?, *E. indica* var. *ceylonica*, *E. indica zeylonica*, *E. chrysomelina*, and *E. wissmanni processa* that were identified by Weise, Sicard, Korschefsky, Shiraki, Nunenmacher and others. *H. sparsa* and *H. 28-punctata* (Fabr.) can be distinguished by their external appearance. *H. sparsa* has 12–28 spots present on the elytra. In 12 spotted specimens, elytral spot 3 is never subrectangular; in 28 spotted specimens, elytral spots cb3d lie approximately in a straight line. The apical angles of the elytra are distinct in both sexes. In the ♂, the hind margin of the visible abdominal sternite 5 is truncate or slightly concave and the visible abdominal sternite 6 emarginate; the ♂ genitalia have an emargination on outer edge of the apical 1/3 of the aedeagus and the tip of the penis is pointed. The ♀ genitalia have a notch with sharp, dark edge toward the apex on the inner edge of the genital plate about 1/3 from its base. *H. 28-punctata*, on the other hand, has 28 elytral spots but cb3d are never in a straight line and the apical angles of the elytra are rounded in both sexes. In the ♂, the hind margin of visible abdominal sternite 5 is slightly concave to truncate and the visible abdominal sternite 6 is entire and convex; the ♂ genitalia have the tip of the penis rounded, with a deep notch. The ♀ has a semicircular notch on the inner edge of the genital plate about 1/5 from the base. For the characters separating this species from *H. indica* see remarks under *H. boisduvali*.

Henosepilachna pusillanima (Mulsant) Figs. 1, 13, 25–27, 46.

Epilachna pusillanima Mulsant, 1850, Spec. Coleopt. trimeres securipalpes. Paris, 784.

E. dentulata Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 46, figs. 23–25, 120, 182. New

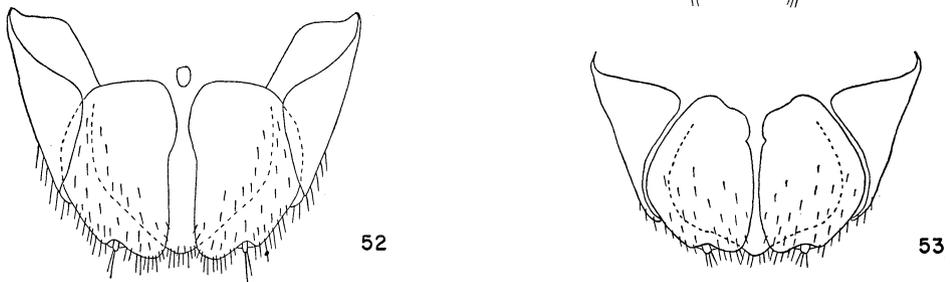
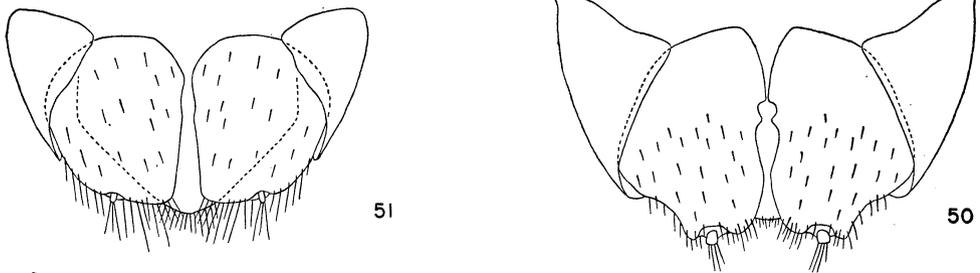
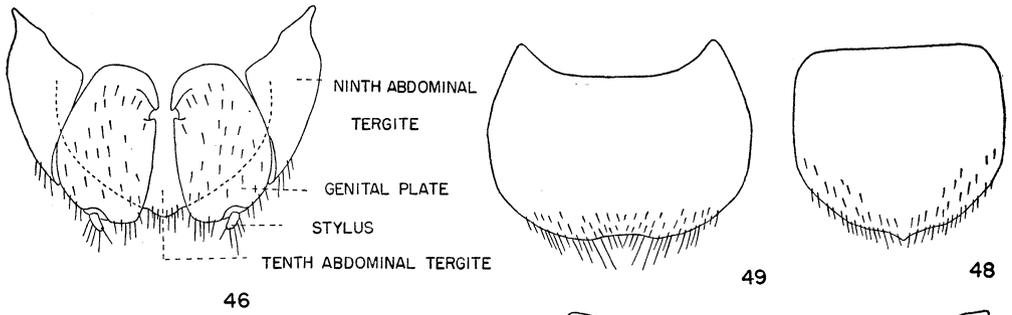
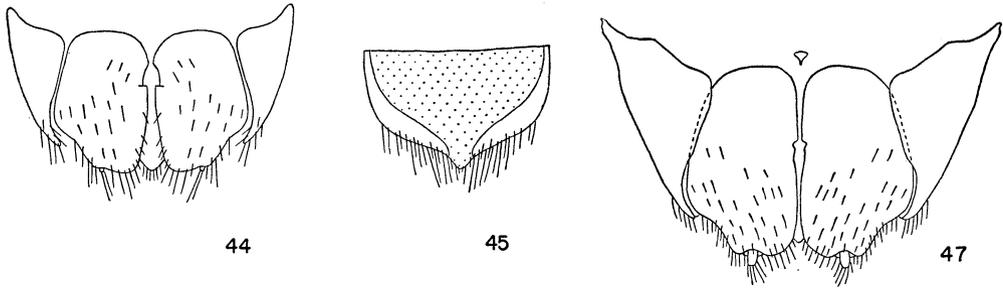
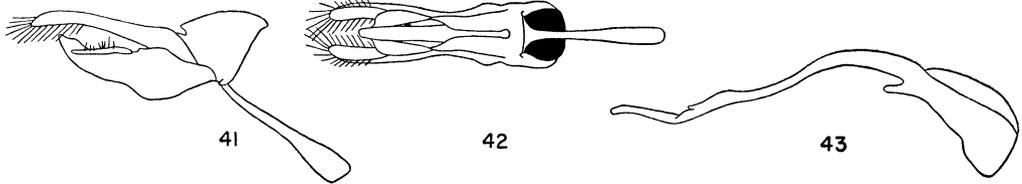
Synonymy.

E. dentulata subsp. *parvinotata* Dieke, 1947, *ibid.*, 47, figs. 24–25. New **Synonymy.**

Length: ♂ 7.0 (6.9–7.2) mm, ♀ 7.6 (7.0–8.4) mm.

Color and maculation (fig. 13): Upper side brownish-red. Pronotum spotless or with 1–4 faint black spots. Elytra each with six black spots; 6 the largest; 4 next largest; 1 and 5 nearly the same distance from suture; 3 much farther from suture than 1 and 5; 2 closer to elytral base than to elytral margin; 6 closer to elytral margin than to suture; 4 transverse, touching elytral margin. In addition, 8 nonpersistent spots all present in one specimen from Formosa and spot h present in the type. Ventral side and appendages pale brownish red except tip of mandible and hind corners of metasternum black; sides of visible abdominal sternites 3–5 somewhat black; elytral spot 4 reaching 1/2 to 3/4 of width of epipleurae.

Figs. 41–53. 41, lateral view of ♂ genitalia of *H. semifasciata*; 42, ventral view of genitalia of *H. semifasciata*; 43, lateral view of penis of *H. semifasciata*; 44, ventral view of ♀ genitalia of *H. sparsa*; 45, abdominal tergite 10 of ♀ of *H. sparsa*, dorsal view; 46, ventral view of ♀ genitalia of *H. pusillanima*; 47, ventral view of ♀ genitalia of *H. wissmanni*; 48, abdominal tergite 10 of ♀ *H. wissmanni*, dorsal view; 49, abdominal tergite 10 of ♀ *H. processa*, dorsal view; 50, ventral view of ♀ genitalia of *H. processa*; 51, ventral view of ♀ genitalia of *H. boisduvali*; 52, ventral view of ♀ genitalia of *H. vigintioctomaculata*; 53, ventral view of ♀ genitalia of *H. semifasciata*.



Elytron: Apex rounded. *Abdomen*: Abdominal lines subcomplete, angulate or subangulate, reaching to about 1/6 or 1/7 of distance from apical margin to base of sternite (fig. 1). Hind margin of visible abdominal sternite 5 of ♂ slightly concave⁷; truncate, with median process in ♀. Abdominal sternite 6 of ♂ subtruncate; split in ♀.

Male genitalia (figs. 25–27): Aedeagus in profile 1.61 (1.56–1.66) mm long. Upper side of aedeagus with 8 small teeth (really low transverse ridges when seen from above.) Pale yellowish setae on basal 4/5. Parameres each 1.37 (1.32–1.41) mm long, with an apical thorn and 2 rows of pale yellowish setae on apical 2/5. Penis with end pointed. Gonopore on dorsal side just before apex, oval. *Female genitalia* (fig. 46): Apex of abdominal tergite 10 pointed. Genital plates each 0.56 (0.53–0.61) mm long, greatest width 0.36 (0.34–0.37) mm; apical edge emarginate, basal margin rounded; with oval notch on inner edge near base; borders of notch near inner edge dark.

Type: ♂, in Museum of Zoology, University of Cambridge, England. *Type locality*: Java, East Indies.

Material examined: *Type*: ♂, East Indies (Chevrolat); *Paratypes* (of *H. dentulata* (Dieke)): From the Philippines: 2♂♂, Bonga, July 1924 (A. Duvag); Mindoro Isl., Port Galera (McGregor). We have also seen 7 other specimens (3♂♂ and 4♀♀) from the following localities: *Taiwan*: Heito, May–June, 1931; Koshun, 27 Feb. 1917; Taihanroku, 7–15 June 1908. *Philippines*: Manila, 8 Sept. 1945; Batangas, 7 Aug. 1945; Samar, 10 July 1924; Sibuyan I.

Remarks: the type of *H. pusillanima* (Muls.) and two paratypes (males) of *H. dentulata* (Dieke) have basically identical genitalic structures. In the type, on the upper side of aedeagus there are small teeth (low, transverse ridges when seen from above), but according to Dieke (1947) these small teeth may occasionally practically disappear in *H. dentulata* (Dieke). *H. pusillanima* and *H. dentulata* should be regarded as the same species. Dieke (1947) described a 12-spotted form of *H. dentulata* (Dieke) as a subspecies, *H. dentulata parvinotata* (Dieke). We have found that both the 28-spotted form and the 12-spotted form occur in Formosa. These are individual variations and it is not reasonable to regard this form as a subspecies. The 12-spotted form of this species can be easily distinguished from the other 12-spotted species. It differs from *H. semifasciata* (Dieke) and *H. boisduvali* (Mulsant) in the ♂ by having the hind margin of visible abdominal sternite 6 truncate; in the ♀ by having visible abdominal sternite 5 subtruncate with a median process. The 28-spotted form of this species may be distinguished from *H. sparsa* (Herbst) by the rounded elytral tips.

***Henosepilachna wissmanni* (Mulsant)** Figs. 14, 28, 29, 47, 48.

Epilachna wissmanni Muls., 1850, *Species Coleopt. trimeres securipalpes*. Paris, p. 832.—Crotch, 1874, *Rev. Coleopt. fam. Coccinellidae*. London. p. 86.—Weise, 1908, *Stett. Ent. Ztg.* **69**: 217.—Dieke, 1947, *Smithsonian Misc. Coll.* **106** (15): 55, figs. 31, 123, 190.

E. weissmanni, Gorham, 1901, *Stett. Ent. Ztg.* **62**: 212.

Shape and length: Broad cordiform. ♂ 9.2 (8.4–9.7) mm, ♀ 8.8 mm.

7. Dieke (1947) described the hind margin of visible abdominal sternite 5 as slightly concave with a very slight median process in the ♂ and truncated in the ♀. We have examined 2♂♂ and 2♀♀ which had been studied by Dieke and find that the median process is only on the hind margin of visible abdominal sternite 5 of the ♀, not of the ♂.

Color and maculation (fig. 14): Upper side pale brownish-red. Pronotum spotless. Elytra each with 6 black, persistent spots, somewhat rounded, except 4 transversely prolonged and touching elytral margin; 2 situated on callus; 3 farther from suture than 1 and 5, the latter 2 nearly equidistant from suture; 6 closer to elytral margin than to suture. In addition, nonpersistent spot c present, of same size as 1 (the smallest among persistent spots). In one specimen, nonpersistent spot d also faintly present. Ventral side and appendages of a paler color than upper side except tip of mandible black and hind corners of metasternum concolorous with dorsum. Elytral spot 4 reaching 3/4 width of epipleura.

Elytron: Apical angle distinct. *Abdomen*: Abdominal lines subcomplete, subangulate, reaching to about 1/5 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 broadly emarginate in ♂, subtruncate with a median process in ♀. Visible abdominal sternite 6 deeply emarginate, split in ♀.

Male genitalia (figs. 28–29): Aedeagus in profile 3.01 (2.85–3.17) mm long, upper edge of aedeagus with light yellowish setae on about apical 1/2; basal knife edge developed. Length of aedeagus from posterior edge of phallosome to apex about 0.18 mm. Parameres each 2.63 (2.51–2.75) mm long, laterally compressed, with distinct apical thorn and with 2 rows of light yellowish setae on apical 1/3. Between apex of each of parameres and apical thorn a distinct pit present. Apex of penis pointed, slightly bent dorsad, with dorsal, elongate gonopore. *Female genitalia* (figs. 47–48): Apex of abdominal tergite 10 pointed. Genital plates somewhat kidney-shaped; 0.68 mm long, greatest width 0.40 mm; apical edge emarginate; with a notch on inner edge near basal 3/8.

Type locality: Celebes.

Material examined: 4♂♂, 1♀: *Taiwan*: Taihorinsho, Aug. 1909. *Celebes*: Macassar; South Celebes, Bonthain, 1882; North Celebes, Toli-Toli.

Henosepilachna processa (Weise) Figs. 2, 15, 16, 30–32, 49–50.

Epilachna wissmanni ab. *processa* Weise, 1908, Stett. Ent. Ztg. 69: 217.

Shape and length: Slightly elongate cordiform. ♂ 8.8 (8.5–9.3) mm, ♀ 9.4 (8.7–9.9) mm.

Color and maculation (figs. 15–16): Upper side brownish-red. Pronotum varies from spotless to having all 7 black spots very faintly present, 3 and 4 or 3, 4 and 7 coalescing. Elytra each with 6 black, persistent spots, their arrangement similar to that of *H. wissmanni* except sometimes 4 not touching elytral margin. In addition, 1–8 black, non-persistent spots variably present. Sizes of persistent and non-persistent spots variable. Rarely, persistent spots coalescing: 1+2 and 3+4 or 3+4 and 5+6. Ventral side light brownish-red, except tip of mandible, hind corners or entire hind part of metasternum black, and sometimes faint black spots scattered on mesal and lateral part of abdomen. Elytral spot 4 mostly reaching 2/3 of width of epipleura.

Elytron: Apical angle distinct. *Abdomen*: Abdominal lines complete or subcomplete, subangulate, reaching to about 1/9 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 broadly emarginate in ♂; subtruncate with a median process in ♀. Visible abdominal sternite 6 deeply emarginate in ♂, split in ♀.

Male genitalia (figs. 30–32): Very similar to those of *H. wissmanni*. Aedeagus in profile, 3.05 (2.97–3.14) mm long, ending in an apical point; upper edge of aedeagus with pale yellowish setae on apical 1/2; basal knife edge developed. Length of aedeagus from

posterior edge of phallotreme to apex 0.22 mm. Parameres each 2.83 (2.71–2.97) mm long, laterally compressed, with sharp apical ridge instead of apical thorn and with 2 rows of light yellowish setae on apical 1/3. Penis curved near base forming a right angle. Apex of penis pointed with gonopore dorsal, elongate, a small liplike process just before gonopore. *Female genitalia* (figs. 49–50): Hind margin of abdominal tergite 10 concave. Genital plates each 0.71 (0.69–0.74) mm long, greatest width 0.46 (0.43–0.49) mm; apical edge emarginate and outer apical edge deeply and broadly concave; with a notch on inner edge near basal 3/8.

Type locality: East Indies. *Cotype*: 1 ♀, in British Mus. (Nat. Hist.).

Material examined: 28 (8 ♂♂, 20 ♀♀). Holotype of *H. wissmanni punctata* (Dieke), ♀, Kuraru, Formosa, 8 Aug. 1934, Gressitt. Paratypes of *H. wissmanni punctata* (Dieke): Kuraru (1 ♂, May 1935, Gressitt; 1 ♀, June 1935, Gressitt; 1 ♂, Rokki, 17 May 1934, Gressitt. *Taiwan*: Alikang, Oct. 7; Antun, 2 Aug. 1929; Chirifu, 19 May 1934; Koshun, April 1940; April–May 1918; Kuraru, 28 June 1928; R. Takahashi and K. Fukuta, 21–26 Aug. 1932; 2 May 1935; 14 July 1937, M. Chūjō; Taihanroku, 4–7 July 1908; 8–17 April 1908; Taihoku, 7 July 1927; Taihorin, 7 Nov. 1911; Tainan; Zentai, 28 Aug.–3 Sept. 1907; Naifunpo, 9 Sept. 1924.

Remarks: This species was regarded as aberration of *H. wissmanni* by Weise. In collections we have seen 13 specimens of this species under the names, *Epilachna wissmanni*, *E. wissmanni* ab *processa*, *E. wissmanni* var., and some manuscript names, that were identified by Weise, Korschefsky, Yoshida, Kapur, and Dieke. The latter are the same as a cotype (♀) of *H. wissmanni* ab *processa* (Weise) in general morphology and in genitalic structure. The description and figures here presented of *H. processa* (Weise) have been checked with the cotype by R. D. Pope of the British Museum (Nat. Hist.). *H. processa* and *H. wissmanni* are very closely related and very similar in external appearance but the former can regularly be distinguished from the latter by the following characters: the body of *H. processa* is slightly elongate cordiform with thick pubescence on the upper side, resulting in a lusterless appearance; in *H. wissmanni* the body is broad cordiform with thin pubescence on the upper side. The genitalia of *H. processa* are similar to those of *H. wissmanni*. In the ♂ genitalia of *H. processa* the part of the aedeagus from the bend to the apex is about 0.25 mm long; the apices of the parameres have a sharp apical ridge instead of an apical thorn; and the apex of the penis has a liplike process; in the ♀ the genital plate is somewhat triangular, the proximal part of the genital plate is narrower than its distal part, and the hind margin of abdominal tergite 10 is slightly concave. On the other hand, the ♂ of *H. wissmanni* has the same bent part only about 0.16 mm long and the apices of parameres with a pointed apical thorn. Between the apical thorn and the apex of each paramere, there is a distinct pit. In the ♀ the genital plate is somewhat kidney-shaped and the apex of abdominal tergite 10 is pointed. With all of these differences between the two forms it seems more reasonable to regard *H. processa* as a distinct species.

Weise (1908) described *H. wissmanni* ab *forsteri* (Weise) as differing from *H. wissmanni* in having elytral spots 3, 4 and 5 enlarged and coalescing. In collection of *H. processa* we have seen 2 ♀♀ specimens that have the persistent spots enlarged and some of them coalescing (1 + 2 and 3 + 4 or 3 + 4 and 5 + 6). This difference seems rather slight and such differences are usually observed in various specimens of a single species in *Hemosepilachna*. It is possible of course that after examination of the type of *H. wissmanni*

ab. *forsteri* (Weise) that the synonymy will be revised.

Henosepilachna boisduvali (Mulsant) Figs. 17, 33–36, 51.

Epilachna boisduvali Mulsant, 1850, Species Coleopt. trimeres securipalpes. Paris, 765.—Crotch, 1874, Rev. Coleopt. fam. Coccinellidae. London, 86.—Weise, 1898, Archiv Naturg. **64** (1): 257.—Weise, 1902, Termesz. Fü. **25**: 494.—Fauvel, 1903, Revue d'Ent. **22**: 320.—Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 79, figs. 51, 52, 135, 198.

Length: ♂ 6.6 (5.9–6.9) mm, ♀ 7.2 (6.4–7.9) mm.

Color and maculation (fig. 17): Upper side yellowish red. Pronotum spotless except one specimen with one faint median black spot. Elytron with 6 black spots; 3 farther from suture than 1 and 5, the latter 2 are almost equidistant from suture; 3 often an oval-shaped spot with tip toward suture; 2 situated on callus; 4 subrounded and close to elytral margin, or transversely prolonged and touching elytral margin, closer to elytral margin than to suture. Under side and appendages concolorous with dorsum, except tips of mandibles, sides of metasternum and often entire metasternum, and part of abdomen black. Elytral spot 4 reaching about 1/2 of width of epipleuron.

Elytron: Margins quite flattened, tips rounded. *Abdomen*: Abdominal lines complete or subcomplete, reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 subtruncate to slightly concave in both sexes. Visible abdominal sternite 6 slightly emarginate in ♂ and split in ♀.

Male genitalia (figs. 33–36): Aedeagus in profile 1.39 (1.33–1.45) mm long; bent dorsad at apical 1/4. Upper side of aedeagus with 2 rows of light yellowish setae except on apical 1/10. Parameres each 1.24 (1.20–1.28) mm long; with apical thorn; inner edge with light yellowish setae on about apical 1/2, outer edge with light yellowish setae on about apical 1/4, setae more dense at apex. Penis bifurcate at tip. *Female genitalia* (Fig. 51): Genital plates each 0.55 (0.53–0.57) mm long, greatest width 0.44 (0.42–0.46) mm, apical edge slightly emarginate, a depression on inner edge of ventral side near base. Abdominal tergite 10 convex⁸ with sclerotized brown strip along each side, medially membranous.

Type in Paris Museum. *Type locality*: Australia ?

Material examined: 43 specimens (19 ♂♂, 24 ♀♀): *Taiwan*: Chipon, 25 Mar. 1935, Kankau, 7 April 1912; Kotosho, Mar.–April 1932; June–July 1938; May 1937; May 1935; Mar.–June 1920; Rikiriki, Mar. 1924; Taihanroku, 6–18 April 1908. *Ryukyu*: Amami-Oshima, July 1939; Ishigaki I., May 1933; Iriomote I., 29 July 1932. *Philippines*: Biliran I., Mt. Makiling, Luzon; Bukidnon Prov., Tangcolan.

Remarks: In collections we have seen 5 specimens under the names *Epilachna indica*, *E. 28-punctata* ab. and *E. subfasciata*? identified by Yoshida and Korschefsky. *H. boisduvali* and *H. indica* (Muls.) are very similar in size and in the external appearance. However, we have examined the type of *H. indica* (Muls.) and find that they can be easily distinguished by their external appearance. *H. indica* has spots 1–7 present on the pronotum; elytral spot 3 is subrectangular; the apical angles of the elytra are distinct, in the ♂ the hind margin of visible abdominal sternite 5 is concave and visible abdominal ster-

8. Not emarginate, contrary to Dieke's (1947) assertion, even on specimens he examined.

nite 6 is emarginate; the genitalia have the basal part of the aedeagus very thick in profile; each paramere has a long, sharp apical ridge, and the tip of the penis is subpointed. *H. boisduvali* usually has the pronotum spotless; elytral spot 3 is oval; the apex of the elytron is rounded. In the ♂, the hind margin of visible abdominal sternite 5 is subtruncate to slightly concave and abdominal sternite 6 is slightly emarginate; the genitalia have the basal part of the aedeagus slightly thick in profile; the parameres each has an apical thorn, and the tip of the penis is bifurcate. For the characters separating this species from *H. 28-punctata* (Fabricius) see remarks under *H. sparsa*.

Henosepilachna vigintioctomaculata (Motschulsky) Figs. 18, 37–40, 52.

Epilachna vigintioctomaculata Motsch. 1857, Etudes Ent. 6: 40.—Weise, 1892, L'Abeille. 28: p. 6.—Lewis, 1896, Ann. Mag. Nat. Hist. ser. 6, 17: 24.—Mader, 1926–1937, Evidenz der palaearktischen Coccinelliden, 35, T. 1, Fig. 36.

E. niponica Lewis, 1896, Ann. Mag. Nat. Hist. ser. 6, 17: 23–24.—Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 50, figs. 27, 28, 122. **New Synonymy.**

E. vigintioctomaculata v. *niponica*, Mader, 1926–1937, *ibid.*, 36, T. 1, Fig. 37.

E. vigintioctomaculata ab. *incompleta* Mader, 1936, Ent. Anzeiger 16 (20): 359.

E. vigintioctomaculata ab. *coalescens* Mader, 1936, *l. c.*

E. pustulosa Kono, 1937, Ins. Matsumurana 11: 99, fig. 1. **New Synonymy.**

E. niponica subsp. *coalescens*, Dieke, 1947, Smithsonian Misc. Coll. 106: 54, figs. 29, 30.⁹

Length: ♂ 7.2 (6.6–7.7) mm, ♀ 7.6 (6.6–8.3) mm.

Color and maculation (fig. 18): Upper side reddish brown or reddish yellow. Head often with 2, somewhat united, median, black spots; or with an additional transverse black band along posterior margin of head; or spotless. Pronotum with spots 3, 4 and 7 united to form a somewhat triangular, median, black spot; its anterior end close to anterior margin of and posterior end close to or on posterior margin of pronotum (rarely spot 7 is still separated); and spots 1 and 5, 2 and 6 united or separated. In dark specimens, pronotum entirely black leaving only a narrow anterior and lateral margin pale. Scutellum (which is partially or entirely enveloped by elytral spot 1 in dark specimens) black or dark or pale. Elytron with 14 spots (spots, a, d, g, and h are faint, spot d especially in one specimen from Asaka, Fukushima, Japan; spot a is very faint or absent, each condition has been observed in 2 available specimens from Kambaiti and Sadon, Burma); nonpersistent spots slightly smaller than or nearly as large as persistent spots; spots 1, d, 5, and g close to or on suture with their counterparts on other elytron. Sometimes some spots coalescing; 2+1+2, 3+4, b+c, e+f, or g+h. Except 3+4 these coalescing spots all present in dark specimens from Burma and some from mainland China. Sometimes these dark specimens with an additional narrow black strip around all elytral margins and suture connecting all spots which are on elytral margins and on suture. Rarely, some other spots also coalescing; 2+3 and 5+6, 3+d+3 or 3+5. Pubescence yellowish or gray, dark or black on spots but some also yellowish or gray on some spots in some specimens from Asaka, Fukushima, Japan; uniformly yellowish or gray in specimens from Burma and in some from mainland China. Under side and appendages nearly concolorous with dorsum,

9. For additional literature see Junk's Coleopterorum Catalogus 16, 1931.

except sides of metasternum and mesal part of basal visible abdominal sternites black. In dark specimens black areas spread over nearly entire under side including femora and tibiae of legs and epipleura; mesal depression of visible abdominal sternite 5 of ♀ usually pale.

Elytron: Tip rounded. In 2 available specimens from Hokkaido, Japan, apex of elytron expanded laterally to form an oblique swelling; spot h enlarged and extended to apex of this swelling; epipleuron not narrowed behind but broadened nearly uniformly to apex of each elytron. *Abdomen*: Abdominal lines subcomplete, somewhat rounded or subangulate, reaching to about 1/7 or 1/8 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 slightly concave in ♂; truncate with slight convexity in middle and a mesal depression on about apical 1/2 of sternite in ♀. Visible abdominal sternite 6 emarginate in ♂; split in ♀.

Male genitalia (figs. 37–40): Aedeagus seen in profile, 1.68 (1.50–1.95) mm long strongly bent dorsad near apex and slightly bent backward just before apex. Upper side of aedeagus with pale yellowish setae on about apical 1/2 and 4–7 retrorse teeth, variable in size; basal knife edge small. Parameres each 1.64 (1.45–1.93) mm long, with apical thorn and pale yellowish setae on apical 2/3. Penis with tip as in fig. 40. Gonopore situated obliquely dorsally just before tip. *Female genitalia* (fig. 52): Genital plates each 0.61 (0.57–0.67) mm long, greatest width 0.39 (0.38–0.41) mm; with a shallow notch slightly closer to basal than apical end. Hind margin of abdominal tergite 10 convex.

Type locality: Shimoda, Japan (Simoda, Japon).

Material examined: 177 specimens (80 ♂♂ and 97 ♀♀): *Taiwan*: Kilung. *Mainland China*: Kirin Prov., June 1935; Kwan, N. China, July 1929; Pin-chang Prov., Yablonya St., July 1939; Ping-kiang Prov., Yu-chuan, June 1939; Sekiga, Kwantung, July 1937; Szechuan Prov., Kwanhsien, July 1928; Tatsienlu; Tatsienlu-Kiulung; Tibet Prov.; Yunnan Prov., A-tun-tsi. *Burma*: Kambaiti, 1000 m, April 1934; 2000 m, May, June 1934; Sadon, 1200 m, June–July. *Japan*: Asaka, Fukushima, July 1954; Ashoromura (Tokachi), Hokkaido, July 1946; Aug. 1949; Chikkabetsu (Tokachi), Hokkaido, July 1946; Hatano, Nara, July 1952; Hiroshima-ken, May 1939; Hokkaido, July; Hunatomani, Reibun-To, Hokkaido, Aug. 1937; Hutyu, Tokyo, Aug. 1949; Jyozankei, Hokkaido, Sept. 1933; Kabuka, Reibun-To, Hokkaido, Aug. 1937; Kane-mura, Wakayama, July 1947; Kurema, Kyoto, July 1952; Sept. 1953; Miya; Mt. Hiko-san, Aug. 1941; Mt. Koya, Wakayama, July 1952; Mt. Tsurugi, Sikoku, July 1949; Nagano-shi, July 1932; Nisihama-mura, Kyoto, July 1950; Obihiro, Hokkaido, Aug. 1947; Ogiyama, Yamanashi, Honshu, July 1931; Ogonzawa, Nagano, 1936; Sanbongi (Mutsu) Honshu, Oct. 1935; Sapporo July 1932; Mar. 1903; June 1905; Seryo, Kyoto, July 1952; Aug. 1952; Tei-Maoka, Karafuto, July 1930; Toshino, Honshu, July 1930. *Korea*: Kononei, Mt. Myoko, Heian-hokudo, July 1937. *Okinawa*: May 1925.

Remarks: *Henosepilachna vigintioctomaculata* (Motsch.), *H. niponica* (Lewis), and *H. pustulosa* (Kono) from Japan, *H. vigintioctomaculata* ab. *incompleta* (Mader) from Korea and *H. vigintioctomaculata* ab. *coalescens* (Mader) from Szechuan, China were originally described as 3 distinct species and 2 aberrations. We have available 66 specimens from Asaka, Fukushima, Japan in which the elytral spots 1, d, 5, and g are separated by a narrow sutural margin in pale specimens, which agrees with the original description of *H. vigintioctomaculata* (Motsch.); these 4 spots are sometimes united on the suture in dark

specimens which agrees with the original description of *H. niponica* (Lewis); in these dark specimens some spots are coalesced such as 2+1+2, 3+4, b+c, e+f, or g+h which seems identical with *H. vigintioctomaculata* ab. *coalescens* (Mader). These 3 forms occur in the same locality and have identical genitalic structures. These are most likely, then, only spot variations and do not warrant specific, subspecific, or even varietal names.

In collections we have seen 5 specimens of *H. vigintioctomaculata* from Asaka, Fukushima, Japan and from Burma in which some spots are faint or absent but which have identical genitalic structures with specimens of this species having 28 spots. Some specimens of this species with some spots missing have been described as *H. vigintioctomaculata* ab. *incompleta* by Mader. Variation in the number of spots is very common in *Henosepilachna* and in *Epilachna*.

We have available 6 specimens of *H. pustulosa* (Kono) determined by Utida and Sakagami. Two of them from Hokkaido and Chikkabetsu, Tokachi, Hokkaido agree with the original description of *H. pustulosa* (Kono) completely in having the elytra expanded apically as described above. The only difference between *H. pustulosa* (Kono) and *H. vigintioctomaculata* (Motsch.) is that the apex of the aedeagus bends slightly more posteriorly just before apex in *pustulosa* than that in *vigintioctomaculata*, and the notch on inner edge of the genital plates is shallower in *pustulosa* than in those of *vigintioctomaculata*. *Vigintioctomaculata* also occurs in Tokachi, Hokkaido. In regard to the apical expansion of elytra, we have seen that the tips of the elytra may or may not be prolonged into a beak in some specimens of *Epilachna acuta* (Weise) from mainland China but the genitalia are identical. With such slight differences between *H. pustulosa* and *H. vigintioctomaculata*, it seems reasonable to regard them as variations of the same species.

***Henosepilachna semifasciata* (Dieke)** Figs. 3, 19–21, 41–43, 53.

Epilachna indica ab. *ceylonia* Korschefsky (not Weise), 1933, Nat. Hist. Soc. Formosa, Trans. 23 (128–129): 302.

Epilachna semifasciata Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 105, figs. 70, 148.

Length: ♂ 5.8 (5.3–6.5) mm, ♀ 6.3 (5.8–6.9) mm.

Color and maculation (figs. 19–21): Upper side brick red. Pronotum spotless or 3+4, 3+4 and 7, 3+7 faint black spots present; spot 3 and 4 or 3, 4 and 7 coalescent when they are present. Elytron with 6 black spots: 1 and 5 to close to suture or touching it; 3 farther from suture than either 1 or 5; 3 and 4 transversely widened, 3 wider than 4; 4 touching elytral margin (except in one specimen in which it is close to elytral margin). Often 1 and 2, 3 and 4 unite to form 2 transverse fasciae or only 3 and 4 to form a single transverse fascia; sometimes there is only a narrow connection between 1 and 2 or 3 and 4. Ventral side partly black, appendages concolorous with dorsum except tip of mandible black.

Elytron: Tip rounded. *Abdomen*: Abdominal lines complete or subcomplete, reaching to about 1/6 to 1/10 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 of ♂ slightly concave, truncate in ♀. Visible abdominal sternite 6 of ♂ also concave, split and widely separated by a deep notch in ♀. Part of ♀ genital plates can be seen through this notch.

Male genitalia (figs. 41–43): Aedeagus in profile stout, 1.11 mm long. On upper side

of aedeagus a subsemicircular, laminate process appears as a narrow ridge with some short setae scattered on its surface. Basal knife edge small and low. Aedeagus seen from below with a conspicuously subsemicircular, laminate process projecting at right angles along each side on about apical 1/2. Parameres each 1.04 mm long, narrowing after basal 1/3 and slightly curved ventrad at about apical 1/4. Two rows of pale yellowish setae on apical 1/3, more dense at apex. Penis with a dorsal, thin sclerotized, laminate process on basal 1/4, curved ventrad irregularly. Penis seen from above with a lateral constriction at apical 1/4, a median spine-like ridge on the construction¹⁰. *Female genitalia* (fig. 53): Apex of abdominal tergite 10 pointed. Genital plates each 0.51 (0.48–0.52) mm long, greatest width 0.35 (0.34–0.35) mm; apical edge emarginate and inner proximal margin slightly emarginate. On inner edge near base there is a very slight, indistinct, emargination (depression on ventral side distinct), edge of emargination darkened. The genital plate of one ♀ specimen (in which spot 3 does not touch the elytral margin) are short, the inner proximal margin is not emarginate and the outer edge is more rounded. This specimen was collected with a typical ♂ at Hoozan, April 1910 by H. Sauter. It may be, therefore, simply a minor variation from the typical form.

Type: U. S. National Museum No. 57134 (♂). *Type locality*: Musha, Formosa.

Material examined: 22 specimens (12 ♂♂ and 10 ♀♀), all from Taiwan. Holotype: ♂, Musha, 1 May 1929, K. Sato; Arisan, 12 May 1935; Hoozan, April 1910; Horisha, May–Aug. 1918; Kankau, April 1912; Kanzangoe, 13 Aug. 1933; Koshun, April 1918; Shinchiku, July 1918; Taihanroku, 8–18 April 1908; Taiheizan, July 1930; Taihorin, Nov. 1910; 1911; Taihorinsho, Aug. 1909; Taito, 25 Feb.–27 Mar. 1919.

Remarks: In collections we have seen 7 specimens of this species identified as *Epilachna indica* ab. *ceylonica* Weise by Korschevsky and as *E. subfasciata* Weise by Korschevsky, Yoshida and Shiraki. *H. semifasciata* can be distinguished from *H. indica* (Muls.) by having rounded tip on elytron (see remarks under *H. boisduvali*). We have checked Weise's description of ♂ genitalia of *H. subfasciata* (Weise) (1923) with that of this species. They are quite different. This species is easily recognized by having spot 3 transversely rectangular, by the deep notch which separates the visible abdominal sternite 6 of ♀, and by the distinctive characters of the ♂ genitalia.

Genus *Epilachna* Chevrolat

Epilachna Chevrolat, 1837, IN Dejean's "Catalogue des Coleopteres..." ed. 3, 5: 460.

Solanophila Weise, 1898, Deutsche Ent. Zeitschr. 1898: 99, 101.

Afissa Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 8, 113. **New Synonymy.**

Type species: *E. borealis* (Fabricius).

The description of this genus is made in comparison with that of *Henosepilachna*. If the characters are the same as those of *Henosepilachna*, they are not redescribed.

Length ♂ 6.6 (4.1–10.1) mm, ♀ 6.9 (4.0–12.0) mm. Coloration brownish yellow to brick red.

10. There are some differences in the tip of penis from Dieke's (1947) description. The tip of penis of the type appears to be broken off.

Head: In 6 species, general structure of mandibles similar to that in *Henosepilachna*. In 12 other species one of the 2 lateral teeth absent. In *E. incauta* and *E. maculicollis*, mandibles somewhat different from the above 18 species. *E. crassimala* has a peculiar mandible structure which is very different from that of any of the other species in the genus (see specific description). Some species, in addition, with a number of small dentes situated between teeth, near anterior dorsal surface, and behind inner lateral tooth along inner edge of mandible. In old individuals these are usually worn off. Maxilla with galea dilated, forming a round apex. *E. crassimala* with a somewhat pointed galeal apex and *E. maxima* with galea as in *Henosepilachna*. Ligula usually conical with a truncated apex. *E. admirabilis*, *E. mobilitertiae*, and *E. gressitti* with ligula like that of *Henosepilachna*.

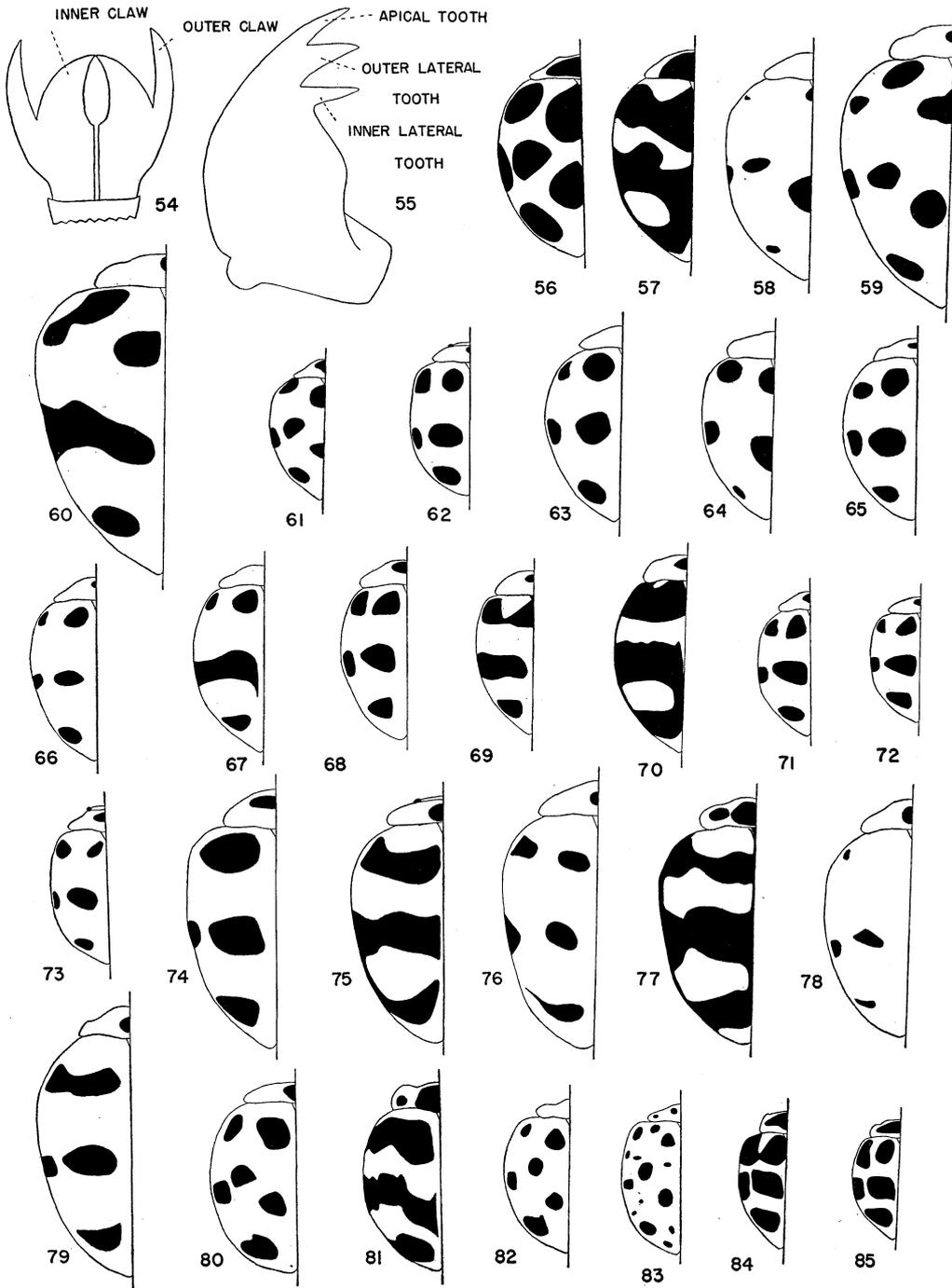
Thorax: Anterior margin of pronotum usually concave. In *E. maxima*, *E. maculicollis*, *E. mobilitertiae*, and *E. gressitti*, anterior margin of pronotum as in *Henosepilachna*. Pronotum spotless or with a median black spot, variable in shape and in size (in extreme cases, pronotum almost entirely black leaving anterior corners or margins light) rarely 2 additional small, black spots present on each side. In *E. sauteri* and *E. admirabilis*, median spot sometimes divided into 2 spots and *E. admirabilis* 2 additional black spots sometimes present.

Elytron: Epipleuron as in *Henosepilachna*, except in *E. mobilitertiae* and *E. gressitti* with 2 grooves or cavities for reception of tips of middle and hind femora. Apical angle of elytron rounded. Elytron with coarse and fine punctures (the type species *E. borealis* has only fine punctures). Elytral maculation more varied in comparison with that of *Henosepilachna*. Basic pattern (based on known Taiwan species) consisting of 6 black spots (except *E. maxima* has an additional spot "a" (fig 59) which is homologous to non-persistent spot "a" in *Henosepilachna*) on each elytron arranged as in fig. 80. Spots 1 and 2 situated basally; 1 and 5 on or not on suture; 3¹¹ and 4 situated at about 2/5 of elytral length from base; 3 close to suture, 4 close to or on elytral margin; 5 situated slightly and somewhat obliquely behind 3; 6 situated at about 1/5 of elytral length from apex and closer to suture than to elytral margin, or vice versa, or even equidistant. These 6 spots variably present (spots 2 and 5 absent in *E. sauteri*; 3 absent in *E. incauta* rarely absent in *E. mobilitertiae*; 5 absent in 14 species; all 6 spots variably present or even entirely absent in *E. admirabilis*) or enlarged and coalesced to form one or more fasciae. Pubescence yellowish, dark or black on spots or fasciae, except in *E. admirabilis* and *E. maxima* from other localities gray on spots and fasciae.

Legs: Tarsal claws as in *Henosepilachna* except basal tooth lacking and, in some species, inner claws apically in contact (fig. 54). *Abdomen*: Number of visible abdominal sternites and punctures as in *Henosepilachna*, except part of visible abdominal sternites

11. The centers of spots 3 and 4 are always situated approximately in a straight line which is perpendicular to the elytral margin. This is a good criterion to determine whether spot 3 or spot 5 is present on each elytron in the 10-spotted species.

Figs. 54–81, Epilachna; 82–85, Afidenta: 54, tarsal claws of *E. maculicollis*; 55, dorsal view of left mandible of *E. flavicollis*, protheca, abductor and abductor apodemes removed; 56–58, *E. admirabilis*; 59–60, *E. maxima*; 61, *E. maculicollis*; 62, *E. flavicollis*; 63, *E. sociolamina*; 64, *E. incauta*; 65, *E. decemguttata*; 66–67, *E. longissima*; 68, *E. crassimala*; 69, *E. microgenitalia*; 70, *E. mushana*; 71, *E. confusa*; 72, *E. formosana*; 73, *E. chinensis*; 74, *E. sauteri*; 75, *E. lata*; 76, *E. media*; 77–78, *E. angusta*; 79, *E. bifibra*; 80, *E. mobilitertiae*, 81, *E. gressitti*; 82–83, *A. mimetica*; 84–85, *A. arisana*.



7-8 protruded in some species, and mesal part between abdominal lines of visible abdominal sternite 1 bearing large, circular punctures which diminish in size from base to apex in some species. In most species, abdominal lines complete or subcomplete, rounded or broadly rounded, reaching to about 1/4 to 1/9 of distance from apical margin to base of mesal part of visible abdominal sternite 1. Abdominal lines somewhat variable within single species. In ♂, hind margin of visible abdominal sternite 5 truncate; or truncate and slightly concave, slightly emarginate; or broadly depressed in middle; or broadly convex. In ♀, visible abdominal sternite 5 broadly convex, or broadly emarginate, or truncate. Visible abdominal sternite 6 in ♂ of most species variable but emarginate, or subtruncate, or broadly convex, or convex; in ♀ convex, or broadly convex, or with a slight emargination, or with a deep notch, but not split.

Male genitalia: Phallobase variable in shape from dorsal view but all with a longitudinal, dorsal, median suture. Upper side of aedeagus lacking setae (except for few scattered setae in *E. augusta* and a single seta in one specimen of *E. lata*) and basal knife edge. No apical thorn on apices of parameres. Apodeme of phallobase not laterally compressed. *Female genitalia*: Hind margin of abdominal tergite 10 convex, or subtruncate, or truncate, or with a deep emargination, or with apical part folded down and over. In most species, genital plates somewhat triangular, or pear-shaped, or trapezoidal, or united by mesal membranous part, but all without notch on inner edge near base.

KEY TO TAIWAN SPECIES OF EPILACHNA

1. Mandibles with external edge very thick (about the same thickness from base to near apex) and flat **crassimala**
Mandibles with external edge thin (not the same thickness from base to near apex) and slightly convex 2
- 2 (1). Inner claws in contact apically (fig. 54). Inner claws much wider than outer... 3
Inner claws not in contact apically..... 5
- 3 (2). Elytra each with 6 black spots **maculicollis**
Elytra each with 5 black spots 4
- 4 (3). Spot 1 on suture..... **incauta**
Spot 1 not on suture **sociolamina**
- 5 (2). Epipleura each with 2 grooves or cavities for reception of tips of middle and hind femora 6
Epipleura without these grooves or cavities 7
- 6 (5). Elytron with 3 black fasciae **gressitti**
Elytron with 6 black spots, spot 3 rarely absent or united with 4..... **mobiliteritiae**
- 7 (5). Mesal part of visible abdominal sternite 1 with large circular punctures. Ligula conical or conical with truncated apex..... 8
Mesal part of the sternite 1 with fine punctures more or less as on the rest of abdomen. Ligula conical with truncated apex..... 11
- 8 (7). Ligula conical, apex not truncated. ♀ sternite 6 broadly convex. ♂ with hind margin of visible abdominal sternite 6 emarginate, visible abdominal tergites 7-8 entirely covered by tergite and sternite 6..... **admirabilis**
Ligula conical with truncated apex. Hind margin of the sternite 6 bilobed, with a deep notch between lobes (♂ unknown) **bifibra**

- Ligula conical with truncated apex. ♀ sternite 6 strongly convex with slight emargination. ♂ with hind margin of the sternite 6 with deep emargination, tergite 8 and part of 7 appearing through emargination..... 9
- 9 (8). Apex of penis blunt (from dorsal view), not dilated and without 2 retrorse points on each side; ♀ sternite 6 with a longitudinal, median, shallow groove..... **angusta**
 Apex of penis (from dorsal view) slightly dilated, with median, sharp point bent dorsad and with 2 retrorse points on each side (fig. 129); sternite 6 without longitudinal groove in ♀ 10
- 10 (9). Apex of aedeagus 0.52 (0.46–0.57) mm in width, with emargination (fig. 127).
 **lata**
 Apex of aedeagus 0.40 mm in width, without emargination, somewhat truncate (fig. 130); ♀ unknown..... **media** ♂
- 11 (7). Elytron with 4 black spots (very rarely basal spot, termed spot 1, absent), sometimes spots 3 and 4 united to form fascia **sauteri**
 Elytron with more than 4 black spots, which may be united to form fasciae ... 12
- 12 (11). Length of body more than 8 mm; spot "a" present and may be united with spot 2 (figs. 59–60) **maxima**
 Length of body less than 7 mm; spot "a" absent 13
- 13 (12). Elytron with 5 black spots, spot 2 situated behind callus **decemguttata**
 Elytron with 5 black spots (spot 5 absent), which may be united to form fasciae, spot 2 or fascia 1 situated on callus 14
- 14 (13). Elytron with 3 black fasciae; fascia 1 located basally, leaving scutellum and a spot on each side of scutellum yellowish red; fasciae 2 and 3 united along suture **mushana**
 Elytron with 5 black spots, which may be united to form fasciae but not as described as above 15
- 15 (14). Pronotum with a transverse median black spot, variable in size (in extreme cases, it extends more than 2/3 the width and more than 1/2 the length of pronotum, or almost entirely black leaving margins light). Spot 1 may or may not be on suture..... 16
 Pronotum with or without a median black spot, sometimes when median spot present with 2 additional small spots on each side, or these 3 spots partially united. Spot 1 not on suture..... 17
- 16 (15). Spots 3 and 4 united to form a fascia; rarely spots 3, 4 and 6 (elytron with 5 black spots; spot 5 absent) united, nearly occupying apical 1/2 of each elytron **microgenitalia**
 Spots 3 and 4 never united **chinensis**
- 17 (15). Mandible with a tridentate apical tooth and 2 lateral teeth (fig. 55)..... **flavicollis**
 Mandible with a tridentate apical tooth and one lateral tooth..... 18
- 18 (17). Length of body more than 5.8 mm; spot 3 and 4 usually united to form a fascia **longissima**
 Length of body less than 5.5 mm; spot 3 and 4 very rarely partially united ... 19
- 19 (18). Size of body: ♂, 4.2 (4.1–4.4) and ♀, 4.2 (4.0–5.0) mm long, ♂, 3.6 (3.2–4.0) and ♀ 3.7 (3.3–4.1) mm wide; spot 3 wider than 6 (elytron with 5 black spots; spot 5 absent), 3 usually more than twice as wide as long;

hind margin of visible abdominal sternite 6 convex in ♂ **formosana**
 Size of body: ♂, 4.9 (4.7–5.1) and ♀, 5.1 (4.8–5.5) mm long, ♂, 4.1 (3.6–4.4)
 and ♀, 4.1 (3.6–4.8) mm wide; spot 3 very rarely wider than 6 (elytron with
 5 black spots; spot 5 absent), 3 less than 2 × or 1.5 × as wide as long;
 hind margin of visible abdominal sternite 6 subtruncate to truncate in ♂...
 **confusa**

Epilachna admirabilis Crotch Figs. 56–58, 86–89, 148.

Epilachna admirabilis Crotch, 1874, Rev. Coleopt. fam. Coccinellidae, London, p. 81.—Weise, 1912, Archiv Naturg. **78** A (12): 112.—Tao, 1927, Lingnaam Agric. Rev. **4** (2): 158, fig. 59.

Solanophila alternans Weise (not Mulsant), 1923, Archiv Naturg. **89** A (2): 182.

S. alternans ab. *grayi* Weise (not Mulsant), 1923, *l. c.*

S. admirabilis, Mader, 1926–1937, Evidenz der palaearktischen Coccinelliden. I. Teil, p. 40, t. 2, fig. 8.

S. grayi Korschefsky (not Mulsant), 1933, Nat. Hist. Soc. Formosa, Trans. **23** (128–129): 301, figs. 6–14.

S. grayi ab. *zebra* Korschefsky (not Sicard), 1933, Nat. Hist. Soc. Formosa, Trans. **23** (128–129): 301, figs. 15–17.

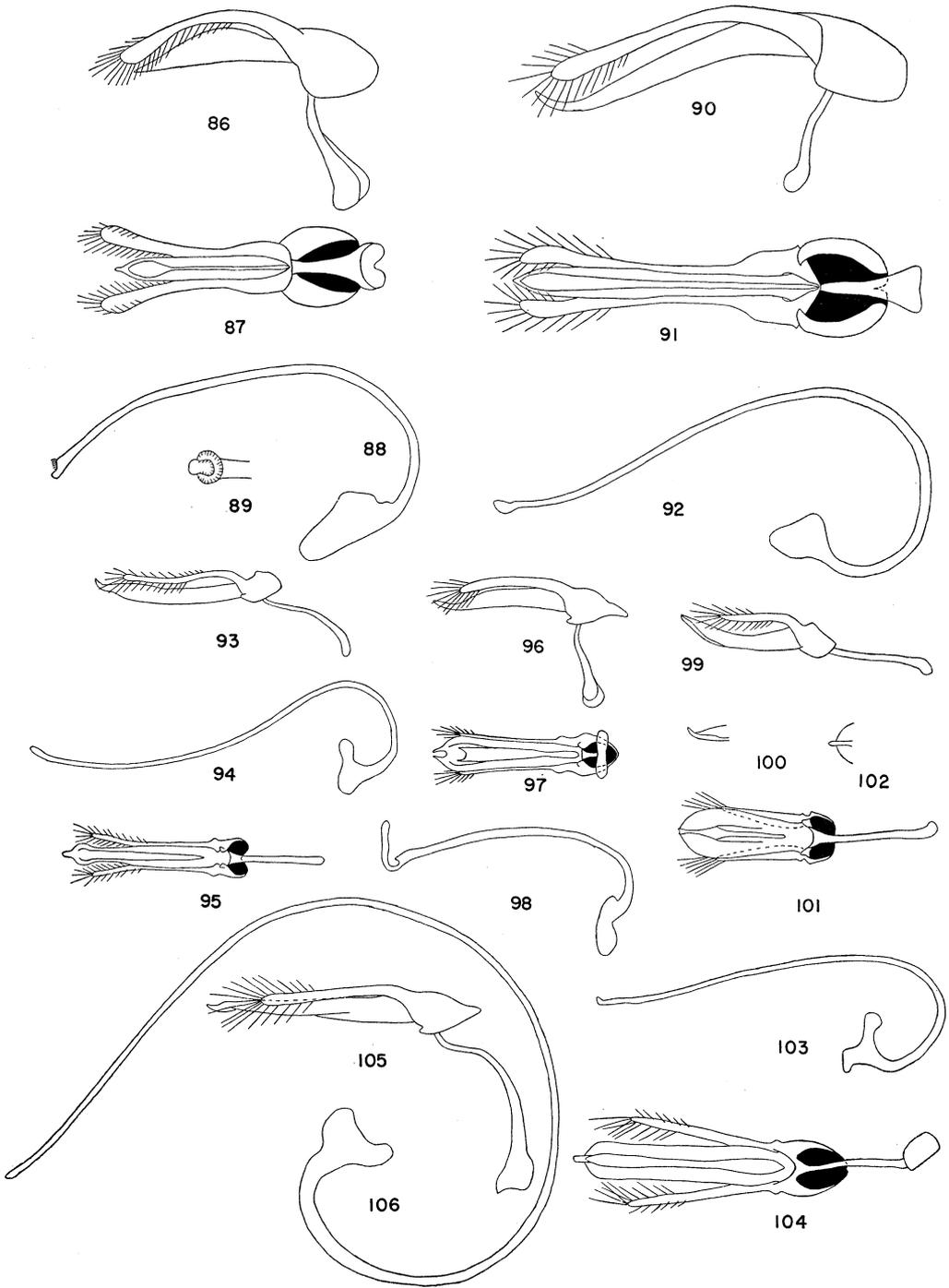
Afissa admirabilis, Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 116, figs. 76, 150, 203.

A. admirabilis subsp. *continentalis* Dieke, 1947, *l. c.*, 118, fig. 77. **New Synonymy.**

Length: ♂ 7.4 (6.8–8.0) mm; ♀ 7.7 (6.6–8.4) mm.

Color and maculation (figs. 56–58): Upper side brown or brownish red or brownish yellow. Head spotless (very rarely with some black areas). Pronotum spotless or with a median black spot, variable in size (in one extreme case pronotum almost entirely black leaving 2 anterior corners pale) or with a median black spot (sometimes it is divided into 2 spots as pronotal spots 3 and 4 in *Henosepilachna*) and two basal black spots (as pronotal spots 1 and 2 in *Henosepilachna*). Elytron with 6 large black spots. Spots 1 and 5 on suture, continuous with their counterparts on opposite elytron, anterior end of 1 enveloping tip of scutellum, which is pale, and posterior end sometimes slightly separated from suture. Anterior end of 2 on callus and sometimes emarginate in front of callus; 3 more remote from suture than 6; 4 on elytral margin; 6 closer to elytral margin than to suture

Figs. 86–106. *Epilachna*: 86, lateral view of ♂ genitalia of *admirabilis*, penis removed; 87, ventral view of ♂ genitalia of *admirabilis*, penis removed; 88, lateral view of penis of *admirabilis*; 89, tip of penis of *admirabilis*; 90, lateral view of ♂ genitalia of *maxima*, penis removed; 91, ventral view of ♂ genitalia of *maxima*, penis removed; 92, lateral view of penis of *maxima*; 93, lateral view of ♂ genitalia of *maculicollis*, penis removed; 94, lateral view of penis of *maculicollis*; 95, ventral view of ♂ genitalia of *maculicollis*, penis removed; 96, lateral view of ♂ genitalia of *flavicollis*, penis removed; 97, ventral view of ♂ genitalia of *flavicollis*, penis removed; 98, lateral view of penis of *flavicollis*; 99, lateral view of ♂ genitalia of the type, *incauta* (tip of aedeagus is broken), penis removed; 100, lateral view of tip of aedeagus of *incauta*; 101, ventral view of ♂ genitalia of the type, *incauta* (tip of aedeagus is broken), penis removed; 102, ventral view of tip of aedeagus of *incauta*; 103, lateral view of penis of the type, *incauta*; 104, ventral view of ♂ genitalia of *longissima*, penis removed; 105, lateral view of ♂ genitalia of *longissima*, penis removed; 106, lateral view of penis of *longissima*.



(in specimens from Burma, anterior end of 1 enveloping almost entire scutellum, which is partially black, and posterior end often slightly separated from suture; 2 and 6 nearly touching or touching base and elytral margin respectively). Pubescence yellowish, dark or black on spots (gray in pronotal spot in the type and gray on all spots in specimens from Burma). Under side and appendages pale, except tips of mandibles black; or epipleura, femora, metasternum, metaepisterna and abdomen with black areas in varying degrees; prosternum and mesosternum very rarely with some black areas. The 6 spots on elytron may decrease in size and may be entirely absent or variably present (in specimens from mainland China, 1 and 6 are sometimes resolved into two oval spots narrowly separated from suture; 2 strongly emarginate in front of callus). In addition to being sometimes reduced or absent, some of these spots may coalesce as follows: 1+2, 3+4, 3+5 (the type is one of this form, with black pubescence between 3 and 4); 3+4+5; 1+2 and 3+4; 1+2 and 3+4+5; 1+2 and 3+4+5+6; 1+2 and 3+4+5+6, with narrow black strip connecting between 4 and 6; 1+2 and 3+4+5, with narrow black strip connecting 2, 4 and 6; 1+2 and 3+4+5+6, with narrow black strip connecting 2, 4 and 6; 1+2 and 3+4+5+6, with narrow black strip connecting 1 and 5, and 2, 4, and 6 (the maculation pattern with these 6 spots on each elytron united and connected with narrow black strip are very similar in appearance to the maculations of *E. lata* and *E. angusta*).

Mandible: With a tridentate apical tooth and 2 lateral teeth. In addition, a number of dentes of various sizes situated between teeth, near anterior dorsal surface, and behind inner lateral tooth along inner edge of mandible.

Abdomen: Abdominal lines subcomplete, variable in shape, reaching to about 1/7 or 1/8 of distance from apical margin to base of sternite. Mesal part of visible abdominal sternite 1 with large circular punctures. Hind margin of visible abdominal sternite 5 truncate or truncate and slightly concave in middle in ♂; broadly convex in ♀. Visible abdominal sternite 6 emarginate in ♂; broadly convex in ♀ (in one specimen 6 is slightly emarginate and in another it is deeply emarginate).

Male genitalia (figs. 86–89): Aedeagus seen in profile, 1.29 (1.17–1.38) mm long, upper edge strongly convex and lower edge slightly concave, apex terminating in a sharp point. Aedeagus seen from below, greatest width in middle 0.27 (0.24–0.28) mm, basal part slightly covered by basal parts of parameres. Parameres each 1.56 (1.43–1.68) mm long, greatest width near apex 0.15 (0.14–0.17) mm, with yellowish setae on about 2/3 of length from apex. Penis bent near base as in fig. 88, gonopore located obliquely, dorsally and surrounded by a circle of short setae (fig. 89). *Female genitalia* (fig. 148): Genital plates each somewhat oval, base narrower than apex, 0.72 (0.67–0.77) mm long, greatest width 0.32 (0.28–0.33) mm. Hind margin of tenth abdominal tergite deeply emarginate.

Type: ♀, in Museum of Zoology, University of Cambridge, Cambridge, England. *Type locality*: "China (Deyrolle), King Hing, Japan (Mniszech)".

Material examined: 229 specimens (96 ♂♂, 133 ♀♀) from the following localities: Type, ♀, China. Paratypes (of *E. admirabilis continentalis* Dieke): 2 ♂♂, 2 ♀♀, Hua Yin Shan 110 km N. of Chunking, Szechuan Prov., China, alt. 750 m, 5 July 1933, D. C. Graham (USNM No. 57136). Paratypes (of *E. admirabilis taiwans* Dieke): Arisan (3 ♂♂, 2 ♀♀, 24 May 1934, L. Gressitt, CAS) (1 ♀, 26 May 1934, Gressitt, CAS); 1 ♀, Hassenzan, 22 June 1934 (Gressitt, CAS); 1 ♂, Musha, 20 May 1932, Gressitt, CAS). *Taiwan*: Arisan, 10 Oct. 1912; June 1914; Dec. 1915; May 1917; Oct. 1918; June 1932; July 1947;

July 1947; July 1947; Aug. 1947; Arisan to Rosha, Tainan-Taichu Districts, Feb. 1948; Antun, Feb. 1925; Baibara, July 1939; Chi-tou, Nantou, July 1955; July 1955; Eboshiyama, May 1933, Kao-Lin, Fau-lein, July 1955; Funkiko, Apr. 1917; Nov. 1926; Aug. 1949; Hoozan, Jan. 1910; Horisha, Aug.; Feb. 1931; Jujiro, April 1931; Kanzangoe (Takaoshu), Nakanoseki-Masuhowaru, Aug. 1932; Karenko, July-Aug. 1919; Kirai-Higashinoko, Karenko cho, June 1943; Kosempo, Aug. 1915; Koshun, Apr.-May 1918; Nov. 1928; Kwarenko, Dec. 1933; Li-Ying, Tai-Chung, July-Aug. 1955; Musha, May 1947; June-July 1947; May 1948; Mt. Arisan, May 1933; May 1933; May 1933; Mt. Niitaka, Aug. 1936; July 1939; Puli, Hen-Chun, Aug. 1954; Piyanan Dangai, July 1931; Raisha, July; Rato, Kohayashi, Aug. 1923; Sakuragamine, Taichu, 2700 m, June 1943; Sekizan, Aug. 1934; Seto, July 1935; Suisharyo, Oct. 1911; Taihanroku, Aug. 1909, Taiheizan, July 1930; May 1942; Taihorin, Oct. 1910; Taihorinsho, Aug. 1910; Aug. 1909; Taito, Feb.-Mar. 1919; Aug. 1932; Aug. 1932; Tattaka-Torokku, Aug. 1921. *Mainland China*: Chekiang Prov., Hangchow, May 1923; Mokansan, Aug. 1937; Tung-lu, Che-Chiang, Apr.-May 1926; Kiangsi Prov.; Kiangsu Prov., Nanking, Apr.-May 1923; Soochow, May 1923; Szechuan Prov., Huaying Shan, Aug. 1932; Moupin, July 1938, Tibet Prov., 2250 m. *Burma*: Kambaiti, May-June 1934, 2000 m. *Japan*: Asakawa, Tokyo, May 1928; Kifune, Kyoto, July 1952; Sobosan (Bungo), Kyushu, July 1931; Mt. Fukuchi, Fukuoka-Ken, July-Aug. 1937; Shiba, Tokyo.

Remarks: The typical form of this species resembles *E. macularis* Mulsant in maculation almost exactly. Most authors mention that these forms can be distinguished by the general shape (*E. admirabilis* is stated to be shorter and more convex than *macularis*), the punctuation (which is much coarser in *admirabilis* than in *macularis*) and especially the elytral pubescence (which is supposedly black on spots in *admirabilis* but gray on spots in *macularis*). We have available the types of these 2 species from the Museum of Zoology, University of Cambridge. In *admirabilis* the pubescence on the pronotal spot of the type and that on spots of specimens from Burma are also gray. In regard on the punctuation, it is useful if both species are available for comparison but is not as clear-cut as indicated by earlier authors. We have found that the punctures on the pronotum are good characters for separating these species. In *admirabilis*, the size of pronotal punctures (which is apparently much larger than that of the fine elytral punctures) is intermediate between the coarse and the fine elytron punctures whereas in *macularis*, the size of pronotal punctures is the same as that of the fine elytral punctures. *macularis* has been recorded from Formosa but is not present in any of the material we have had available.

In collections we have seen 18 specimens identified as *macularis* Muls., *alternans*, *grayi* ab. *zebra* Sic., and *8-maculata* (Thunberg) by Shiraki, Weise, Korschefsky and Sicard. The form of *admirabilis* in which the 6 spots on elytron are reduced in size or either absent or variably present have often been misidentified by earlier authors as *grayi* or *alternans*. The other extreme form, in which most of the 6 spots on each elytron are coalescent have often been misidentified as *grayi* ab. *zebra*.

We have seen the type (♀) of *alternans* from the Museum of Zoology, University of Cambridge. Although the type is very similar to some individuals of *admirabilis* externally and also in the structure of the ♀ genitalia, *alternans* can be recognized by having the pronotal punctures slightly larger than or nearly the same size as those of the fine elytral punctures, and the hind margin of visible abdominal sternite 6 provided with a narrow, deep median notch (Dieke has erroneously indicated that *alternans* has 6 without the notch.

It is not known whether or not *grayi* has such a notch). *E. alternans* has not been collected in Taiwan. It is very difficult to decide whether *alternans* and *grayi* are the same species or not. They were originally described as 2 distinct species by Mulsant (1850) who mentioned that *alternans* can be distinguished from *grayi* by the color (brownish red in *alternans* and rust red in *grayi*), spotless pronotum (*grayi* has a median black spot on pronotum), and the position of spot 1 (which envelopes nearly 1/2 of scutellum in *alternans* but only touches the tip of scutellum in *grayi*). In some variants of *alternans*, spots 1 and 2 coalesce to form a basal fascia, and 3, 4, and 5 to form a mesal fascia. These species were united by Weise (1902). We have examined 16 determined specimens of *alternans* (most of them from Sumatra, Borneo and Java) and 8 determined specimens of *grayi* (most of them from India, Burma and Sikkim) from the British Museum (Nat. Hist.) and the Museum of Zoology, University of Cambridge. These determined specimens agree with Mulsant's descriptions of *alternans* and *grayi* quite well except that 2 from Sumatra have spot 1 touching the tip of the scutellum; another 2 from Sumatra and Borneo have a spot on the pronotum. We have found that specimens either with spotted pronotum or specimens with a spotless pronotum have 6 with or without notch. Specimens with a spotted pronotum, specimens with a spotless pronotum or specimens with elytral fasciae all have the same structure of the ♂ genitalia. In ♀♀ there are no differences in genitalia in specimens with different maculations nor between those with and without the notch on sternite 6. Therefore, it would seem that *alternans* and *grayi* might be the same species which possibly has 2 forms of ♀♀ with or without a notch on sternite 6. In any case, *grayi* has not been collected in Taiwan.

We have examined 4 paratypes of *E. admirabilis* subsp. *continentalis* Dieke and 8 of an unpublished subspecies from Taiwan. Here, Dieke has complicated the problem by considering as 2 subspecies that are only spot variations within one species. They are simply individuals of *admirabilis* with the spots decreased in size or coalesced. All of these spot variations of *admirabilis* are to be found in Taiwan.

Epilachna maxima (Weise) Figs. 59–60, 90–92, 149.

Solanophila maxima Weise, 1898, Archiv Naturg. **64** (1): 236.—Mader, 1926–1937, Evidenz der palaearktischen Coccinelliden, I, p. 46.

S. saginata Korschefsky (not Weise), 1933, Nat. Hist. Soc. Formosa, Trans. **23** (128–129): 300.

Afissa maxima, Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 123, figs. 83, 204.

Length: ♂ 9.6 (8.4–10.1) mm, ♀ 10.7 (9.9–12.0) mm.

Color and maculation (figs. 59–60): Upper side reddish brown. Pronotum with median black spot, variable in size. Elytron with 7 black spots. Spot "a" (according to its position, this is homologous to non-persistent spot "a" in *Henosepilachna*) longer than wide, situated in middle of base, anterior end close to or touching base, posterior end directed obliquely outward; 1 transverse, behind scutellum, on suture (sometimes it is separated into 2 spots almost touching the suture), continuous with its counterpart on other elytron, sometimes its anterior mesal part extending toward scutellum; 2 close to elytral margin, behind callus; 3 more remote from suture than 6; 4 on elytral margin; 5 close to or touching suture; 6 the largest, transversely oval, closer to elytral margin than to suture; among these 7 spots, 2 or more spots coalescing; 3+5, 4+3+5, a+2, 1+a+2 and 4+3+

5, a+2 and 3+5, a+2 and 4+3+5 (the first 4 forms are rare but the last 2 are more often present than "the typical" form.). Pubescence yellowish, black on spots (gray on spots in 2 specimens from Sikkim). Under side and appendages nearly concolorous with dorsum except tip of mandible, hind part of, or almost entire, metasternum black, sometimes prosternum, mesosternum, metaepisterna and anterior mesal part of abdomen with some black areas. Elytral spot 4 extending entire width of epipleura.

Mandible: With a tridentate apical tooth (there is one dens on each side of median tooth) and 2 lateral teeth (inner lateral tooth slightly longer than outer). In addition, 4 dentes situated behind inner lateral tooth along inner edge of mandible. *Abdomen*: Abdominal lines complete, reaching to about 1/5 or 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate, slightly emarginate in middle in ♂; truncate to rather broadly convex with a central depression in ♀. Visible abdominal sternite 6 broadly convex with a notch in ♂; broadly convex in ♀.

Male genitalia (figs. 90-92): Aedeagus seen in profile 3.13 (2.93-3.32) mm long terminating in a sharp point. Aedeagus seen from below with greatest width near middle 0.38 (0.33-0.40) mm, slightly contracted at both ends. Parameres each 3.14 (2.95-3.37) mm long, greatest width near apex, 0.24 (0.21-0.30) mm, with yellowish setae on about 1/3 of length from apex. Penis bent strongly near base as in fig. 92, apex slightly dilated, with gonopore located dorsally just before apex. *Female genitalia* (fig. 149): Genital plates somewhat pear-shaped, 1.00 (0.98-1.02) mm long, greatest width 0.46 (0.42-0.48) mm. Hind margin of abdominal tergite 10 truncate, very slightly convex in middle.

Type locality: Assam.

Material examined: 22 specimens (8 ♂♂, 14 ♀♀) from the following localities: *Taiwan*: Kanshirei, 7 May 1908; Karenko, July-Aug. 1919; Li-Ying, Tai-Chung, July-Aug. 1955; Musha, June-July 1947; Shinchiku, July 1918; Taiheizan, 28 Oct. 1932, 9 July 1933, May 1935, June 1934. *Sikkim*: Gopaldhara, Rungbong Vall., 1916.

Remarks: In collections we have seen 3 specimens identified as (*Henosepilachna*) *wissmanni* (Mulsant) and *saginata* (Weise) by Yoshida and Korschefsky. These 2 species can be easily separated from *E. maxima* (Weise) by their generic characters. In the original description of *saginata*, Weise (1902) placed it in the genus *Solanophila* and mentioned that it is related to *E. maxima* (Weise). We have available one ♀ specimen from Tonkin, Montes Mauson (type locality) identified as *saginata* by Bielawski and it agrees with Weise's original description of *saginata* completely. However, this specimen has tarsal claws provided with a basal tooth and has visible abdominal sternite 6 divided. It therefore belongs to *Henosepilachna* not *Epilachna*. Weise apparently put *H. saginata* (Weise) in the wrong genus and misjudged its relationship to *E. maxima* (Weise).

We have examined Crotch's type of *H. deyrollei* (Crotch), which is also a ♀. This specimen has a tarsal basal tooth and sternite 6 divided. Weise (1898) mentioned that *maxima* (Weise) is related to *deyrollei* (Crotch). This is also erroneous. Actually, these 2 species belong to 2 distinct genera.

***Epilachna maculicollis* (Sicard) Figs. 54, 61, 93-95, 150.**

Solanophila nilgirica var. *maculicollis* Sicard, 1922, Archiv Naturg. 78 A (6): 131.

[non] *S. fallax* Weise. Weise, 1923, op. cit. 89 A (2): 183.

Afissa maculicollis, Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 131, fig. 85A.

Length: 4.7 (4.3–5.1) mm, 4.7 (4.4–5.0) mm.

Color and maculation (fig. 61): Upper side brick red or brownish red (one syntype is yellowish brown). Pronotum with or without a somewhat rounded, median, black spot, much closer to anterior than to posterior margin. Elytron with 6 black spots (one specimen is spotless and the 6 spots are very faint in one other). Spots 1 and 5 on suture, continuous with their counterparts on other elytron, 1 close to tip of scutellum or nearly touching it, sometimes 1 and 5 each still separated into 2 spots close to or touching suture; 2 close to or touching base; 3 more remote from suture than 6; 4 close to or touching margin; 6 transverse, closer to elytral margin than to suture. Pubescence yellowish, dark on spots. Under side and appendages concolorous with dorsum except tips of mandibles and part of or entire metasternum black (in 4 specimens, metasternum is pale), mesal part of abdomen with some black areas or all pale.

Mandible: As in *E. incauta* (in few individuals, there are 2 small teeth in front of the notch and 2 dentes on inner and lower edges of upper and lower teeth of apical tooth respectively). *Claws*: Inner claws much wider than outer, inner claws apically in contact (fig. 54). *Abdomen*: Abdominal lines complete, rounded, reaching to about 1/8 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex in ♀. Visible abdominal sternite 6 slightly emarginate in ♂; convex in ♀.

Male genitalia (figs. 93–95): Aedeagus seen in profile, 1.17 (1.04–1.23) mm long, apex terminating in a sharp point. Aedeagus seen from below, width near apex 0.18 (0.17–0.21) mm, slightly contracted near posterior end, apex rounded on each side and terminating in a blunt point. Basal part of aedeagus completely fused; parameres each 0.92 (0.83–0.97) mm long, width in middle 0.06 (0.06–0.07) mm, with yellowish setae on about 3/5 of length from apex. Penis bent strongly near base as in fig. 94, with gonopore opening dorsally. *Female genitalia* (fig. 150): Genital plates each 0.74 (0.73–0.75) mm long, greatest width 0.26 (0.25–0.27) mm; somewhat triangular, with outer side not very straight; inside the genital plate there is a dark pigmented arc connecting the 2 angles on the longest side. Hind margin of abdominal tergite 10 convex.

Syntypes: 2♂♂, 1♀ in Deutsches Entomologisches Institut, Berlin. *Type locality*: Taihorinsho, Formosa.

Material examined: 44 specimens (20♂♂, 24♀♀) from Taiwan: Syntypes: Taihorinsho (1♂, 1♀, Aug. 1909); 1♂, Oct. 1909; Sauter (DEI). Baikei-Musha, Taichu-Syu, 19 Aug. 1940; Kankau (Koshun), 7 Apr. 1912; Kannon-zan, Taihoku, 1 Feb. 1941; Karenko, July–Aug. 1919; Kizanto, 5 July 1932; Kuraru, 30 Aug. 1921; 1 Sept. 1921; 15 May 1933; Kwareenko, 25 Dec. 1933; Mt. Taiheizan, 10 July 1940; Musha, June–July 1947; Puli, Hen-Chun, 26–31 Aug. 1954, Taichung, 13 Aug. 1940; Taiheizan, 19 July 1940, 10 May 1942; Taipingshan, 27 Aug. 1954; Urai, 1 Oct. 1921; 28 Mar. 1932; 1 Apr. 1932; 26 June 1932; Wang-Wu, Fa-Lein, 15 July 1955; Wulai, 20 Mar. 1953.

Remarks: We have seen 3 specimens (from Taihorinsho, Taiwan) of this species, labelled "Typus" and determined by Sicard from the Deutsches Entomologisches Institut. In the original description of *E. nilgirica* var. *maculicollis* (Sicard) from Sicard's paper (1912), "Description d'espèces et variétés nouvelles des coccinellides de la collection du

Deutsches Entomologisches Museum de Berlin-Dahlem," he mentioned that there are 4 specimens from Formosa of this variety. These 3 specimens agree completely with Sicard's description of this variety and come from the same institute. These must be the syntypes. We have examined 3 specimens (from Nilgiri Hills) of *nilgirica* (Weise) from the British Museum. They are quite different from *nilgirica* var. *maculicollis* (Sicard). Not only are their genitalia different (in *nilgirica*, the aedeagus is very similar to that of *Afidenta mi-metica* Dieke as in fig. 140 but longer and the genital plate is shorter than that of *E. nilgirica* var. *maculicollis*) but also they can be distinguished externally (the abdominal lines are subcomplete and spots 3 and 6 about equidistant from the suture in *nilgirica*; the abdominal lines are complete and spot 3 about twice as far as spot 6 from the suture in *E. nilgirica* var. *maculicollis*). They are most certainly distinct species and not merely varieties of the same species.

In Sauter's collection from the Deutsches Entomologisches Institut, we have found 6 specimens of this species identified as *E. fallax* (Weise) by Weise.

***Epilachna flavicollis* (Thunberg)** Figs. 55, 62, 96-98, 151.

Coccinella flavicollis Thunb., 1781, Dissertatio entomologica novae insectorum species, sistens... Upsaliae, apud J. Edman. Pt. 1, p. 18, t. 1, fig. 26.—1820, Acad. Imp. Sci. St. Petersburg, Mem. 7: 366.—Herbst, 1793, Natursystem aller bekannten in- und ausländischen Insekten. Der Kafer. 5: 282, t. 56, fig. 8.

Epilachna flavicollis, Mulsant, 1850, Spec. Coleopt. Trimeres Securipalps. Paris. p. 800.—Crotch, 1874, Rev. Coleopt. Fam. Coccinellidae. London. p. 82.

Afissa flavicollis, Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 135, figs. 88, 158, 206. For additional literature see Coleopterorum Catalogus. 16: 29, 1931.

Length: ♂ 5.8 (5.2-6.6) mm, ♀ 6.0 (5.2-6.8) mm.

Color and maculation (fig. 62): Upper side brick red (a few specimens from India are light brownish red and one specimen from Java is deeper brick red). Pronotum concolorous with elytra or yellow, with or without a small median black spot (all Formosan specimens with spot), when present closer to anterior than to posterior margin. Elytron with 5 black spots, spot 5 absent. Positions of these 5 spots similar to those of *longissima*; spot 2 somewhat rounded, spots 1 and 2 or 3 and 4 never united (all Formosan specimens with spot 3 slightly transverse in comparison with specimens from other localities). Pubescence yellowish, dark or black on spots. Under side paler than upper side except tip of mandible black, side of metasternum (rarely entirely black) and part of metepisternum slightly dark or black (those of all Formosan specimens black), rarely first 2-4 visible abdominal sternites with some black areas.

Mandible: With a tridentate apical tooth and 2 lateral teeth, sometimes a few dentes on lower edge of median tooth or apical tooth and on inner edge of outer lateral tooth. *Abdomen*: Abdominal lines subcomplete or complete, somewhat rounded or subangular, reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex in ♀. Visible abdominal sternite 6 subtruncate in ♂; convex in ♀.

Male genitalia (figs. 96-98): Aedeagus in profile, 1.12 (1.04-1.25) mm long (the length varies in some specimens from other localities), nearly straight or slightly concave, apex

slightly flattened before bending up in a point (in some specimens from other localities, aedeagus is slightly concave on upper edge at about 1/3 of its length from base). Aedeagus from below, gradually widening from its base for about 1/5 of its length from apex, width at this point 0.28 (0.23–0.31) mm (the width varies gradually in some specimens from other localities), abruptly narrowed posteriorly and terminating in 2 sharp adjacent points (which are slightly divergent in some specimens from other localities). Basal part of aedeagus with a narrow but completely fused area. Parameres each 0.91 (0.83–1.08) mm long, width in middle 0.08 (0.07–0.09) mm, slightly bent ventrad, with yellowish setae on apical 1/5–2/5. Penis bent at both ends in opposite directions, thinner at the bend, with a small projecting process before the bend (small projecting process is absent in all specimens from other localities). *Female genitalia* (fig. 151): Genital plates each 0.89 (0.86–0.94) mm long, greatest width 0.29 (0.25–0.33) mm, elongate, triangular, with basal angle acute. Hind margin of abdominal tergite 10 convex.

Type: ♀, deposited in Zoologiska Institutionen, University of Uppsala, Uppsala, Sweden. *Type locality*: Cape of Good Hope.

Material examined: Type ♀ (no other data). 33 specimens (12 ♂♂, 21 ♀♀): *Taiwan*: Mizuho, 21–23 Apr. 1932, Raisha, 30 Aug. 1927; Rikiriki, 21 Mar. 1924; Rato: Tamaru, 30 Aug. 1923; Taihorinsho, Aug. 1909; Taipei. *Burma*: Burma, 1922; Tenasserim. *Ceylon. India*: Assam, Bombay, Pondicherry, Walayar Forest, Malabar, S. India, Aug. 1957. *Indonesia*: Celebes, Java, West Java. *Sarawak. Thailand. Tonga*.

Remarks: The only differences between Formosan specimens and specimens from other localities are that the ♂ genitalia of Formosan specimens are slightly smaller and the penis of the former have an additional small projecting process before the apical bend. With only such slight difference, it seems reasonable to regard these Formosan specimens as *flavicollis*.

We have seen 3 specimens (1 ♀ and 2 ♂♂) which are labelled *flavicollis* from Thunberg's original collection in the Zoologiska Institutionen, University of Uppsala, Uppsala, Sweden. The labels on these specimens are in Thunberg's handwriting according to Lars Hedstrom. The 2 ♂♂ are *Henosepilachna pusillanima* (Muls.) and *H. indistincta* Dieke. The ♀ specimen, pinned with a 1/2 red and 1/2 black label, agrees with original description completely and must be the type.

***Epilachna sociolamina* Li, n. sp.** Figs. 63, 152.

Length: ♀ 6.8 mm.

Color and maculation (fig. 63): Upper side brick red. Pronotum spotless. Elytron with 5 round black spots, spot 5 absent. Spot 1 closest to suture, 3 next, and 6 most distant; 1 equidistant from suture and from base; 2, the smallest, close to base and elytral margin, anterior part on callus; 3 and 6 about the same size; 4 close to elytral margin; 6 closer to suture than to elytral margin. Pubescence yellowish, dark on spots. Under side and appendages paler than dorsum except tip of mandible and side of metasternum black.

Mandible: With a tridentate apical tooth and one lateral tooth. *Claws*: As in *E. maculicollis*. *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/5 of distance from apical margin to base of sternite. In ♀, hind margin of visible abdominal sternite 5 broadly convex; 6 convex.

Male genitalia: Unknown. *Female genitalia* (fig. 152): Genital plates 0.95 mm long, greatest width 0.64 mm (from external edge of one genital plate to that of the other), united by mesal, membranous part with both ends separated; each plate with narrow external edge sclerotized, a semi-circular depression situated on external edge at about middle of apical 1/2, apical 1/2 of external sclerotized edge folded dorsally and over. Hind margin of abdominal tergite 10 convex.

Holotype ♀, Taihoku (Taipei), Taiwan, June (no further data); in Department of Plant Pathology and Entomology, National Taiwan University, Taipei, Taiwan, China.

Remarks: This is the only species seen with the genital plates united medially by a membrane.

***Epilachna incauta* Mulsant** Figs. 64, 99–103.

Epilachna incauta Muls., 1850, Spec. Coleopt. trimeres securipalps. Paris. p. 803.—Crotch, 1874, Rev. Coleopt. fam. Coccinellidae. London. p. 82.

Solanophila incauta, Sicard, 1910, Soc. Ent. France, Ann. 79: 377.

Afissa incauta, Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 139, fig. 224.

Length: ♂ 5.4 (5.2–5.6) mm, ♀ 5.8 (5.2–6.5) mm.

Color and maculation (fig. 64): Upper side yellowish red. Pronotum yellowish, spotless. Elytra red with elytral margins and apices yellowish; each elytron with 5 black spot, spot 3 absent. Spot 1 subround and 5 somewhat heart-shaped, both of these on suture, continuous with their counterparts on other elytron; 1 enveloping tip of scutellum; 2 round, on callus; 4 transversely oval, close to elytral margin but not in contact; 6, the smallest, faint, closer to elytral margin than to suture. Pubescence yellowish, dark on spots. Under side and appendages yellowish except tips of mandibles, hind corners of metasternum, tarsal segments, claws, and mesal parts of first 2 visible abdominal sternites all dark.

Mandible: Apical tooth (from frontal view) consisting of 3 teeth with median tooth the largest, upper tooth smaller, and lower tooth smallest. A deep notch situated between upper tooth and median tooth; another small tooth in front of this notch. Mandibles seen from above with lateral tooth less developed than upper tooth and an additional broad, short tooth situated far behind lateral tooth. *Claws*: As in *maculicollis*. *Abdomen*: Abdominal lines subcomplete, reaching to about 1/5 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex to truncate in ♀. Visible abdominal sternite 6 emarginate in ♂; convex, with a faint median, longitudinal, lightly sclerotized area in ♀.

Male genitalia (figs. 99–103): Aedeagus flattened in profile, 1.07 (1.00–1.14) mm long, gently bending ventrad as about 2/3 of its length from base, then gently bending dorsad, and strongly bending dorsad again to a sharp point just before tip. Aedeagus from below, gradually widening from its base for about 2/3 of its length; width at this point 0.36 mm, abruptly narrowed posteriorly to a blunt point. Basal part of aedeagus completely fused. A narrow median ridge between the blunt point and phallosome. Parameres each 0.74 (0.68–0.81) mm long, width in middle 0.07 (0.07–0.08) mm, slightly narrowed at tip and slightly bent ventrad near base, with light yellowish setae on apical 2/3. Penis strongly bent near base, apex as in fig. 103. Gonopores on dorsal side just before apex. *Female geni-*

talia: Genital plates each 0.80 (0.73–0.83) mm long, greatest width 0.34 (0.33–0.35) mm; very similar to that of *E. maculicollis* (fig. 150) but 2 angles on longest side of genital plate more obtuse and rounded, and basal angle slightly expanded laterally just before its end. Hind margin of abdominal tergite 10 convex.

Type: ♂, in Museum of Zoology, University of Cambridge, Cambridge, England.
Type locality: Java.

Material examined: 5 specimens (2 ♂♂, 3 ♀♀). *Type*, ♂, Java (Chevrolat, MCZ). *Taiwan*: Taihorinsho, Aug. 1909. *Java*. *Sumatra*: Siolak Daras., Korinchi Valley, 950 m, Mar. 1914; Sungei Kumbang, Korinchi, 1400 m, Apr. 1914.

Remarks: We have had available only one ♀ specimen of this species from Formosa. This had been checked with the type. Unfortunately, they are of different sexes. Other than sexual difference the only difference between them is that the Formosan specimen has spot 5 on the suture, spot 6 removed from the elytral margin and is larger than the type (6.5 mm). The type has spots 5 and 6 close to the suture and to the elytral margin respectively. Length of type is 5.2 mm. However, the variation in position of spot 5 and size variation are also observed in *E. maculicollis* and *E. admirabilis*. In regard to spot 6, it is also removed from the elytral margin in 2 specimens of this species from Sumatra which we have examined. With such slight difference, it seems reasonable to regard this Formosan specimen as *E. incauta* until the examination of ♂♂ from Formosa can settle the question.

Crotch (1874) mentioned: "In some varieties [of *E. incauta*] the spots are united forming a basal and medial fascia." Dieke (1947) has pointed out that Crotch may have had other species involved such as *gedeensis* (Dieke). We have examined one other specimen identified as this species (possibly by Crotch) from Crotch's collection in addition to the type. This specimen is large (6.2 mm) and has 5 spots on each elytron with 1 and 2 uniting to form a basal fascia. In addition to the maculation and size differences, this specimen is very different from the type in having the mandibles of the *flavicollis* type with an additional broad, short tooth situated just behind the 2 lateral teeth; and the inner claw (which is widely separated from the opposite inner claw) slightly wider than outer. It seems to us it is neither *incauta* nor *gedeensis*. Unfortunately, being a ♀, it is hard to identify it correctly. We suggest that it belongs to a distinct species.

***Epilachna decemguttata* (Weise) Figs. 65, 153.**

Solanophila decemguttata Weise, 1923, *Archiv Naturg.* **89** A (2): 183.

[*non*] *Afissa decemguttata* (Weise), Dieke, 1947, *Smithsonian Misc. Coll.* **106** (15): 147, figs. 98, 167. (misidentification, see *E. confusa* n. sp.).

Length: ♀ 6.2 mm.

Color and maculation (fig. 65): Upper side brownish red or brick red. Pronotum with a median black spot closer to anterior margin than to posterior margin. Elytron with 5 black spots, spot 5 absent. Spot 1 the nearest to suture, 3 the next, and 6 the most distant or 3 and 6 equidistant from suture; 1 short oval, close to base; 2 transverse, situated behind callus; 3 transverse; 4, the narrowest, close to elytral margin; and 6 oval, equidistant from suture and from elytral margin. Pubescence yellowish, dark on spots. Punctures very coarse with fine punctures interspersed. Under side and appendages concolorous with

dorsum except tips of mandibles black, sides of and the most posterior part of abdomen yellowish.

Mandible: As in *E. sociolamina*. *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 broadly convex in ♀ and visible abdominal sternite 6 convex, almost covered by 5.

Male genitalia: Unknown. *Female genitalia* (fig. 153): Genital plates very elongate, triangular, 1.02 (1.00–1.05) mm long, greatest width 0.26 (0.25–0.27) mm, pointed at base, dark at apex and near basal side. Hind margin of abdominal tergite 10 convex.

Syntype: ♀, in Deutsches Entomologisches Institut, Berlin. *Type locality*: Taihorin, Formosa.

Material examined: 3 ♀♀, from Taiwan. Syntype, ♀, Taihorin, 7 Aug. 1911, H. Sauter, (DEI). 2 ♀♀, Horisha, May–Aug. 1918, H. Kawamura.

Remarks: We have seen a specimen (from Taihorin) of this species, labelled "Typus" and determined by Weise from the Deutsches Entomologisches Institut. In the original description of *E. decemguttata*, Weise (1923) mentioned that there are only 2 specimens of this species known. Except that both sides of the metasternum are not black this specimen agrees completely with Weise's original description of this species. This is most probably a syntype.

Dieke (1947) has misidentified the species here named *E. confusa* n. sp. as *E. decemguttata* (Weise). Although these 2 species are very similar in external appearance, they can be distinguished by differences in size (6.2 mm long in *E. decemguttata* and 4.7–5.5 mm long in *E. confusa*), the position of spot 2 (which is behind the callus in *E. decemguttata* and on the callus in *E. confusa*) and the shape of genital plate (which is more elongate in *E. decemguttata* than in *E. confusa*). Weise also emphasized that *E. decemguttata* is equal in size and similar in body structure to *E. flavicollis* (Thunberg).

This species is also very similar to *E. anhweiana* (Dieke) (we have seen a paratype of this species) but can be distinguished by the following characters: *E. anhweiana* is larger (7.5 mm long), spot 3 is much larger than any other spot, and the mandibles have a single, broad, apical tooth and one lateral tooth. *E. decemguttata* is smaller (6.2 mm long), has spot 3 about the same size as spot 6, and the mandibles have an apical tooth which consists of 3 small teeth and one lateral tooth. *E. anhweiana* is not a Taiwan species.

Epilachna longissima (Dieke) Figs. 66–67, 104–106, 154.

Afissa longissima Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 148, figs. 104, 173, 207.

Length: ♂ 6.3 (5.8–6.6) mm, ♀ 6.3 (5.9–6.5) mm.

Color and maculation (figs. 66–67): Upper side light brownish red. Pronotum with or without a small, median black spot, when present closer to anterior than to posterior margin. Elytron with 5 black spots, spot 5 absent. Spots 1 and 3 closer to suture than 6; 1 closer to suture than to base, or equidistant; 2 somewhat triangular, on callus, close to base and elytral margin, sometimes united with 1; 3 and 4 united to form a fascia (sometimes still separated), outer end of fascia close to or touching elytral margin, inner end often extending posteriorly; 6 closer to elytral margin than to suture, or equidistant.

Pubescence yellowish, dark or black on spots or fascia. Under side and appendages colorous with dorsum except tip of mandible, side of metasternum, and parts of metepisternum black.

Mandible: As in *sociolamina*. *Abdomen*: Abdominal lines subcomplete, broadly rounded, reaching to about 1/5 or 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 slightly concave to truncate in ♂; broadly convex in ♀. Visible abdominal sternite 6 emarginate in ♂; convex in ♀.

Male genitalia (figs. 104–106): Aedeagus flattened in profile, 1.68 (1.59–1.78) mm long, decreasing in thickness from base to apex, apex slightly bent up just before tip. Aedeagus from below with greatest width near base 0.32 (0.30–0.34) mm, slightly contracted at base and at about 2/5 of its length from apex, abruptly narrowed posteriorly to a blunt point (with tip bending down). Basal part of aedeagus completely and narrowly fused. A narrow median ridge (with sides almost parallel) present between the blunt point and posterior end of the slit. Parameres each 1.24 (1.17–1.33) mm long, greatest width near apex 0.11 (0.10–0.12) mm, with yellowish setae on about 1/3 of its length from apex. Penis very long and slender, strongly bent as in fig. 106. Gonopore oval, situated apically and ventrally. *Female genitalia* (fig. 154): Genital plates very elongate, triangular, 1.05 (1.01–1.08) mm long, greatest width 0.33 (0.32–0.33) mm, terminating basally in a sharp point, lightly sclerotized near basal side and with slight emargination on inner edge near apex. Hind margin of abdominal tergite 10 convex.

Type: United States National Museum No. 57146. *Type locality*: Taihoku, Formosa.

Material examined: 17 specimens, 9 ♂♂, 8 ♀♀) from *Formosa*. *Holotype*: ♂, Taihoku, 22 Sept. 1927, T. R. Gardner. *Koshun*, 25 April–25 May 1918; *Kweishan*, Taipei, 4 Dec. 1947; *Mokusaku*, 1 May 1932; *Shinten*, 13 Oct. 1939; *Taihoku*, 9 Mar. 1924; 4 Mar. 1932; 25 Apr. 1934; 6 May 1934; *Taipeh*, 15 Dec. 1948; 15 Mar. 1949; *Taito*, 24 Mar. 1935.

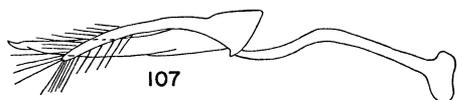
Remarks: *E. flavicollis*, *E. crassimala* and this species are very similar in external appearance but they can be separated easily by the structure of the mandibles (see remarks under *E. crassimala*).

***Epilachna crassimala* Li, n. sp.** Figs. 68, 107–109.

Length: ♂ 6.0 (5.5–6.6) mm, ♀ 6.4 (5.9–7.0) mm.

Color and maculation (fig. 68): Upper side pale brownish red or yellowish brown. Pronotum with a median black spot, closer to anterior than to posterior margin, 2 additional small black spots on each side rarely present. Maculation of elytron very similar

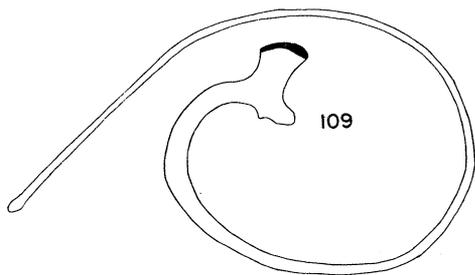
Figs. 107–124. *Epilachna*: 107, lateral view of ♂ genitalia of *crassimala*, penis removed; 108, ventral view of ♂ genitalia of *crassimala*, penis removed; 109, lateral view of penis of *crassimala*; 110, ventral view of ♂ genitalia of *microgenitalia*, penis removed; 111, lateral view of ♂ genitalia of *microgenitalia*, penis removed; 112, lateral view of penis of *microgenitalia*; 113, lateral view of penis of *confusa*; 114, ventral view of ♂ genitalia of *confusa*, penis removed; 115, lateral view of ♂ genitalia of *confusa*, penis removed; 116, lateral view of ♂ genitalia of *formosana*, penis removed; 117, ventral view of ♂ genitalia of *formosana*, penis removed; 118, lateral view of penis of *formosana*; 119, lateral view of penis of *chinensis*; 120, lateral view of ♂ genitalia of *chinensis*, penis removed; 121, ventral view of ♂ genitalia of *chinensis*, penis removed; 122, lateral view of ♂ genitalia of *sauteri*, penis removed; 123, ventral view of ♂ genitalia of *sauteri*, penis removed; 124, lateral view of penis of *sauteri*.



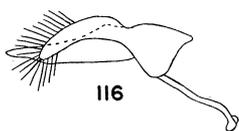
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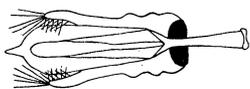
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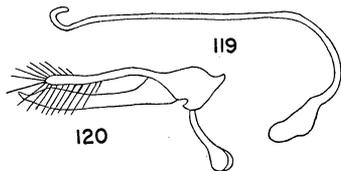
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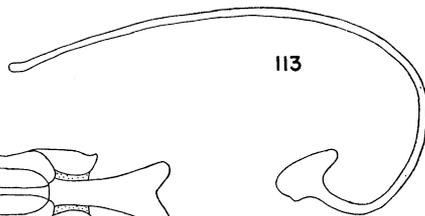


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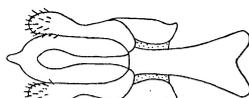
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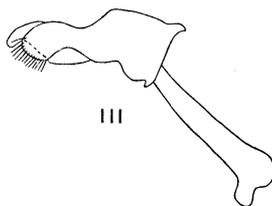
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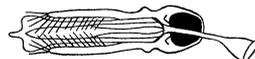
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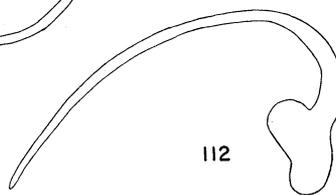
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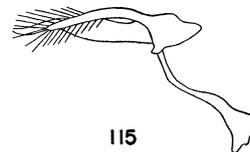
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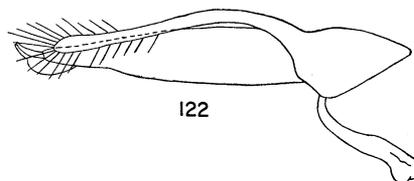
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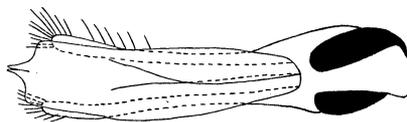
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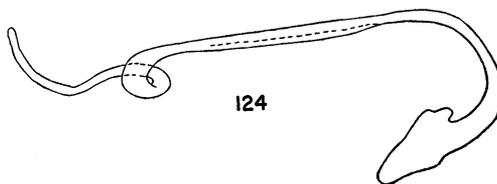
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to that of *E. longissima* except spots 3 and 4 often separated and spot 6 closer to suture than to elytral margin, or equidistant. Colors of pubescence, under side, and appendages also similar to those of *E. longissima* except external edges of mandibles black and sometimes mesal parts of first 2-4 visible abdominal sternites with black areas.

Mandible: Structure of mandibles very different from that of other species. External edge of mandible (from frontal view) very thick and flat, apical tooth consisting of 2 strong teeth; lower one slightly stronger and longer than upper one and lower one with a row of dentes on lower edge (which are often worn off in older individuals). Mandible seen from above with one lateral tooth much smaller than apical tooth. *Abdomen*: Abdominal lines subcomplete or complete, rounded; reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex to truncate in ♀. Visible abdominal sternite 6 emarginate in ♂; broadly convex in ♀.

Male genitalia (fig. 107-109): Very similar to those of *E. longissima* but smaller and shorter; aedeagus 1.49 (1.40-1.56) mm long in profile, greatest width near base 0.31 (0.28-0.32) mm from ventral view; Parameres each 0.98 (0.94-0.99) mm long, greatest width near apex 0.09 (0.08-0.10) mm. Some other slight differences from *E. longissima* as follows; in profile, phallobase shorter and more obtuse, aedeagus more concave on upper edge; from below, edges on each side of aedeagal apex not rounded, with somewhat angular arc. Tip of penis slightly dilated. *Female genitalia*: As in *E. longissima* 1.18 (1.13-1.26) mm long, greatest width 0.36 (0.34-0.40) mm.

Material examined: 43 specimens (16 ♂♂, 27 ♀♀) from Taiwan.

Holotype ♂ (BISHOP 3003), Kweishan, Taipei, 4 Dec. 1947, C. S. Li. *Allotype*, ♀, (BISHOP) same data as holotype. *Paratypes*: Arisan, 27 July 1947; 5 Aug. 1931; 18-30 Sept. 1949; 4 Sept. 1949; 2-23 Oct. 1918; Baibara, 4-7 July 1939; Chingshoeig, Fua-lien, 12 July 1955; Hoozan, 10 Apr.; Kanko-Shinko, Taihoku-shu, 5 Sept. 1932; Kaohsiung, 18 May 1947; Kappanzan, 17 Sept. 1921; Kweishan, Taipei, 4 Dec. 1947; Mokusaku, 1 May 1932; Mt. Arisan, 25 May 1933; Mt. Niitaka, 23 Aug. 1936; Raisha, 26 July 1935; Sinten, 19 May 1940; Tai-Chung (no further data); Taihorin, 10 Nov.; Ta-Kuang, Fa-lien, 14 July 1955; Urai, 20 April 1930; 1 May 1932; Wuche, 23 May 1947; 15 May 1948.

Remarks: This species has very thick mandibles. *E. flavicollis*, *E. longissima*, and this species are very similar in external appearance. Besides the male genitalia, the structure of mandibles is the best character to distinguish them (external edge of mandibles thick and flat in *crassimala*; mandibles of usual form, not thick and flat, with two lateral teeth in *flavicollis* and with one lateral tooth in *longissima*). In collections we have seen 4 specimens of this species identified as *10-guttata* (Ws.), *10-guttata* ab.?, *formosana* (Ws.) ab. (the last one is from Korschefsky's collection, possibly also identified by him), and *Henosepilachna zeylanicus* (Ws.) [= *H. indica* var. *ceylonica* (Ws.)] by Korschefsky. *E. crassimala* can be distinguished from these species by the peculiar structure of its mandibles.

***Epilachna microgenitalia* Li, n. sp. Figs. 69, 110-112.**

Length: 5.7 (5.6-5.7) mm, 5.8 (5.2-6.0) mm.

Color and maculation (fig. 69): Upper side pale yellowish brown. Pronotum with a somewhat transverse median black spot, variable in size, closer to anterior margin than to posterior margin (in one extreme case pronotum almost entirely black leaving margins pale).

Elytron with 5 black spots, spot 5 absent. Spot 1 somewhat triangular, on suture, continuous with its counterpart on other elytron, enveloping 1/2 or almost entire scutellum (which is also dark or black in color); 2 somewhat triangular, smaller than 1, on callus, close to base and elytral margin or touching the latter, slightly united with 1 (except in one specimen from Taitung in which 1 and 2 are still separated and all spots expanded in size); 3 and 4 united to form a fascia, inner end of fascia close to suture and outer end touching elytral margin; 6 variable in size, equidistant from suture and from elytral margin; 3, 4 and 6 united occupying most of apical 1/2 of elytron in one specimen from Taiheizan. Pubescence yellowish, black on spots. Under side and appendages concolorous, or slightly darkened except tip of mandible, meso- and meta-thorax black; abdomen largely black with narrow lateral margin and posterior end pale; spot 4 reaching almost whole width of epipleuron, inner edge of epipleuron touching thorax black; coxae and femora with black areas. In dark specimens, black areas spread more extensively over epipleuron, abdomen, and femora.

Mandible: With an apical tooth consisting of 3 teeth and 2 lateral teeth. Upper tooth of apical tooth minute and median tooth with several dentes on lower edge. Outer lateral tooth with several dentes on inner edge. *Abdomen*: Abdominal lines subcomplete or almost complete, rounded, reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex to truncate in ♀. Visible abdominal sternite 6 broadly convex in both sexes. Visible abdominal tergite 7 visible between tergite and sternite 6 in ♂ but not in ♀.

Male genitalia (figs. 110-112): Phallobase, apodeme of phallobase, and penis highly developed. Aedeagus in profile, 0.33 (0.30-0.37) mm long, bent strongly dorsad at about 2/3 of its length from base and bent ventrad to a blunt point just before tip. Aedeagus from below with greatest width near apex 0.17 (0.16-0.18) mm, basal part slightly covered by parameres, abruptly narrowed posteriorly at about 2/3 of its length from base, terminating in a point; apex laterally compressed. Parameres each 0.32 (0.32-0.33) mm long, width near apex 0.11 (0.11-0.12) mm, compressed at middle, bent slightly ventrad before apex, with short yellowish setae near apex. Penis bent near base, apex pointed. Gonopore on ventral side just before apex. *Female genitalia*: Genital plates and abdominal tergite 10 very similar to those of *longissima* but much smaller and apex more obtuse; 0.87 (0.80-0.93) mm long, greatest width 0.27 (0.23-0.35) mm.

Material examined: 8 specimens (3 ♂♂, 5 ♀♀) from Formosa.

Holotype, ♂ (BISHOP 3004) Arisan, 30 July 1947, C. S. Li. *Allotype*, ♀ (CAS) Arisan 23 May 1934, L. Gressitt, *Paratypes*: Arisan, 2 Aug. 1947; Taitung, 1-10 May 1948; Taiheizan, May 1935; Ta-Kuang, Fa-lien, 14 July 1955; 16 July 1955.

Remarks: This species has very small ♂ genitalia in comparison with its body.

Epilachna mushana Li, n. sp. Fig. 70.

Length: ♀ 6.6 mm.

Color and maculation (fig. 70): Upper side yellowish red, slightly paler behind first fascia on elytron except for a narrow strip along suture. Pronotum with a somewhat triangular black spot, the longest side of triangle close to anterior margin. Elytron with 3 black fasciae. First fascia located basally, the broadest, leaving scutellum and a spot on

each side of scutellum yellowish red; second fascia, the narrowest, situated about middle of elytron, one end close to suture and the other on elytral margin; third fascia extending from suture to elytral margin, situated at about apical 1/3 of elytron. Fasciae 2 and 3 united along suture; elytral margin black between all 3 fasciae. Pubescence yellowish, black on fasciae. Under side concolorous with dorsum except tip of mandible; side of metasternum, posterior part of metathoracic episternum black; sides of abdominal sternites 1-3 with somewhat black areas; appendages and tip of abdomen light.

Mandible: As in *sociolamina*.

Abdomen: Abdominal lines subcomplete, broadly rounded, reaching to about one-sixth of distance from apical margin to base of sternite. Hind margin of visible abdominal 6 sternite broadly convex and visible abdominal sternite 6 convex.

Male genitalia: Unknown. *Female genitalia*: Genital plates very similar to those of *E. longissima* (fig. 154) but more slender, 1.18 mm long; greatest width 0.25 mm.

Material examined: Holotype, ♀, Musha, Formosa, 16 Aug. 1921, T. Esaki, (in Entomological Lab. Fac. of Agric., Kyushu University, Fukuoka).

Epilachna confusa Li, n. sp. Figs. 71, 113-115, 155.

Afissa decemguttata Dieke (not Weise), 1947, Smithsonian Misc. Coll. 106 (15): 147, figs. 98, 167.

Length: ♂ 4.9 (4.7-5.1) mm, ♀ 5.1 (4.8-5.5) mm.

Color and maculation (fig. 71): Upper side dark brownish red. Maculations of pronotum and elytron similar to those of *formosana* except spot 3 very rarely wider than 6 and 3 less than 2× or 1.5× as wide as long. Colors of pubescence, under side, and appendages also as in *formosana* except mesosternum never with black areas.

Mandibles: As in *formosana*. *Abdomen*: Abdominal lines and hind margins of visible abdominal sternites 5-6 as in *formosana* except 6 subtruncate to truncate in ♂.

Male genitalia (figs. 113-115): Aedeagus seen in profile, 1.01 (0.97-1.04) mm long, flattened apically, upper edge concave basally and bent ventrad posteriorly, lower edge straight on basal 1/2 and concave posteriorly, apex terminating in a sharp point. Aedeagus from below with greatest width near apex 0.22 (0.18-0.24) mm, apex with a slightly angular dilation on each side and terminating in a long blunt point. Parameres each 0.68 (0.64-0.72) mm long, greatest width in middle 0.08 (0.07-0.09) mm, bent ventrad near base, with yellowish setae on about apical 1/2. Penis bent as in fig. 113, apex slightly dilated, with gonopore located ventrally just before tip. *Female genitalia* (fig. 155): Genital plates each elongate, triangular, 0.88 (0.78-0.93) mm long, greatest width 0.26 (0.25-0.30) mm, terminating basally in sharp point, slightly sclerotized near basal side. Hind margin of abdominal tergite 10 convex.

Material examined: 12 specimens (6♂♂, 6♀♀, from Formosa).

Holotype ♂ (Zoologisches Museum, Berlin), Hoozan, Jan. 1910, H. Sauter. *Allotype*, ♀ (BISHOP 3005), Kweishan, Taipei, 4 Dec. 1947, C. S. Li. *Paratypes*: Bukai, 13 April 1934, Hoozan, Jan. 1910; Horisha, 10 May 1913; Kosempo, 9-17 May 1908; Koshun, 4 April 1940; Kwareenko, 25 Dec. 1933; Kweishan, Taipei, 4 Dec. 1947; 1 ♀ Wushe, 14 May 1948.

Remarks: This species is very closely related to and easily confused with *formosana*. For characters that will separate them see remarks under *E. formosana*.

Epilachna formosana (Weise) Figs. 72, 116–118.

Solanophila formosana Weise, 1923, Archiv Naturg. 89 A (2): 183.

Length: ♂ 4.2 (4.1–4.4) mm, ♀ 4.2 (4.0–5.0) mm.

Color and maculation (fig. 72): Upper side dark brownish red or brownish yellow. Pronotum with a median black spot, sometimes with 2 additional small black spots on each side, or these 3 spots partially united; median spot closer to anterior than to posterior margin. Elytron with 5 black spots, spot 5 absent. Positions of these 5 spots similar to those of *longissima*. Very rarely spots 1 and 2 or 3 and 4 partially united; 3 and 6 widened transversely; 3 wider than 6, 3 usually more than twice as wide as long (only 1.5× as wide as long in 2 specimens). Pubescence yellowish, dark, or black on spots. Under side and appendages nearly concolorous with dorsum except tip of mandible, side of, or entire, metasternum and part of metaepisterna black; most of mesal part of abdomen with black areas (all pale in 2 specimens); sometimes mesosternum and femora also with black areas.

Mandible: Each with a tridentate apical tooth (which is often worn down in older individuals so that only one or 2 teeth may be seen) and one short, broad lateral tooth. *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/5 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly convex to truncate in ♀. Visible abdominal sternite 6 convex in both sexes.

Male genitalia (figs. 116–118): Aedeagus in profile, 0.47 (0.45–0.53) mm long, upper edge slightly concave posteriorly, lower edge nearly straight and bent up at about 1/3 of its length from apex, apex terminating in a point. Aedeagus from below with width near apex 0.14 (0.12–0.15) mm, slightly widened from base to near apex, abruptly narrowed posteriorly and terminating in a sharp point. Parameres each 0.29 (0.28–0.30) mm long, width in middle 0.06 (0.05–0.07) mm, laterally compressed, bent ventrad, with yellowish setae on about apical 1/2 on upper edge and near apex on lower edge. Penis comparatively thick, bent as in fig. 118. *Female genitalia*: Genital plates as in *confusa*, 0.75 (0.73–0.78) mm long, greatest width 0.23 (0.19–0.26) mm. Hind margin of abdominal tergite 10 convex.

Type locality: Taihorin, Suisharyo.

Material examined: 10 specimens (7♂♂, 3♀♀) from Formosa. Arisan, 10 Oct. 1912; 28 July 1947; Arisan to Rosha, Tainan-Taichu Districts, 26 May 1948; Botangha, 13 Apr. 1932; Mt. Arisan, 24 May 1933; Mt. Linten, Fa-lien, 17 July 1955; Musha-Tattaka, 16 Aug. 1921; Taichung, 13 Aug. 1940; Suisharyo, Oct. 1911; Wushe, Taichung, 23 May 1947.

Remarks: *E. confusa* and this species are very similar in external appearance. The size of the body (♂ 4.9 (4.7–5.1), ♀ 5.1 (4.8–5.5) mm long, ♂ 4.1 (3.6–4.4), ♀ 4.1 (3.6–4.8) mm wide in *confusa* and ♂ 4.2 (4.1–4.4), ♀ 4.2 (4.0–5.0) mm long, ♂ 3.6 (3.2–4.0), ♀ 3.7 (3.3–4.1) mm wide in *E. formosana*), the visible abdominal sternite 6 of ♂, and male genitalia are the best characters to separate them.

Epilachna chinensis (Weise) Figs. 73, 119–121, 156.

Solanophila chinensis Weise, 1912, Archiv Naturg. 78 A (12): 112.—Mader, 1926–1937, Evidenz der palaearktischen Coccinelliden. p. 46, t. 2, fig. 21.

Afissa chinensis, Dieke, 1947, Smithsonian Misc. Coll. 106 (15): 149, figs. 225.

A. chinensis var. *separata* Dieke, 1947, l. c., p. 150. New Synonymy.

Length: ♂ 4.9 (4.4–5.8) mm, ♀ 5.4 (4.9–5.9) mm.

Color and maculation (fig. 73): Upper side brick red or brownish red. Pronotum with a transverse black spot, variable in size (in one extreme case, it extends more than 2/3 width and more than 1/2 length of pronotum), closer to anterior than to posterior margin. Elytron with 5 black spots, spot 5 absent. Spot 1 may or may not be united with its counterpart on other elytron. If it is united with its counterpart, they form a common spot on suture with the anterior end enveloping part of scutellum (which is pale) or reaching near base; sometimes the posterior ends are still separated from suture. If it is not united with its counterpart, it is oval, with inner edge parallel to suture but not in contact, or anterior end of inner edge touching or almost touching suture and posterior end of inner edge removed from suture. Spot 2 on callus, close to base and to elytral margin or almost touching both; 3 transverse, closer to suture than 6 or equidistant; 4 close to or touching elytral margin; 6 somewhat transverse, close to suture and to elytral margin. Pubescence yellowish, dark or black on spots. Under side and appendages nearly concolorous with dorsum, except tip of mandible, side of metasternum, part of metepisternum black or sometimes pale, abdomen sometimes with some black areas.

Mandible: With a tridentate apical tooth (sometimes there are 3 dentes on lower edge of median tooth), 2 lateral teeth and 3 additional small teeth; 1st situated dorsally at base of apical tooth, 2nd at base of inner lateral tooth, and 3rd at inner surface of the 2 lateral teeth. *Abdomen*: Abdominal lines complete or subcomplete, rounded, reaching to about 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate or slightly concave in ♂; broadly convex in ♀. Visible abdominal sternite 6 convex in both sexes.

Male genitalia (figs. 119–121): Aedeagus seen in profile, 1.01 (0.92–1.08) mm long, apex terminating in a point. Aedeagus from below with width near apex 0.21 (0.20–0.22) mm, very slightly compressed near base and in middle, apex abruptly narrowed posteriorly in a long blunt point. Parameres each 0.86 (0.78–0.88) mm long, greatest width near apex 0.09 (0.08–0.10) mm, slightly widened near apex, with yellowish setae on upper and lower edges to about 1/4 and 1/2 of its length from apex respectively. Penis bent at both ends in opposite directions, gonopore oval and terminal. *Female genitalia* (fig. 156): Genital plates triangular, pointed basally, 0.82 (0.71–0.92) mm long, greatest width 0.27 (0.24–0.29) mm. Hind margin of abdominal tergite 10 convex.

Type: Hamburg Museum. *Type locality*: Fo-Kien (Fukien).

Material examined: 44 specimens (18 ♂♂, 26 ♀♀): *Taiwan*: Koshun, 4 Apr. 1940; Kuraru, May 1935; Taihoku, 24 May 1932; 18 Apr. 1938; Tainan, 26 Feb. 1942; Taipei, 21 Mar. 1958; 11 May 1955. *Mainland China*: Chekiang Prov.: Hangchow, May 1923; Mokansan, 20, Aug. 1937; 6 Sept. 1927; Fukien Prov.: Chang Ting, Chin Shan Pu, 14 June 1944; Liung Chon Shan, 21 July 1936; Kiangsi Prov.: An Yuen, 23 May 1948; Tai Au Hong, 4 July 1936; Wong Sa Shui, July 1936; Kiautschau. Kwangtung Prov.: Hau-

leng, Ting-tong, Loh-chang Dist., 1 Aug. 1947. *Java*: 25 Nov. 1912.

Remarks: In collections we have seen that spot 1 can occupy 3 different positions: (1) it may be a common spot on suture, continuous with its counterpart on other elytron; (2) it may be separated into 2 oval spots, with anterior ends touching or almost touching suture and posterior ends removed from suture; (3) it may be also separated into 2 oval spots, with their inner edges parallel to the suture but not in contact. These 3 forms have identical ♂ genitalic structure. It is apparent that *chinensis* var. *separata* (Dieke) is one of these 3 forms. Such variation in spot arrangement is very common in *Epilachna* and it is not reasonable to regard it as a form requiring a varietal name. *E. confusa*, *formosana* and this species are very similar in external appearance but this species can be separated from them by the structure of its mandibles.

Epilachna sauteri (Weise) Figs. 74, 122–124, 157.

Solanophila sauteri Weise, 1923, *Archiv Naturg.* **89** A (2): 128.—Korschefsky, 1933, *Nat. Hist. Soc. Formosa, Trans.* **23** (128–129): 299, fig. 1, 2.

Length: ♂ 8.0 (7.2–8.7) mm, ♀ 8.7 (8.1–9.4) mm.

Color and maculation (fig. 74): Upper side brownish red or brownish yellow. Pronotum sometimes with 2 median black spots, closely adjacent or united to form a transverse spot, spots sometimes entirely absent. Elytron with 4 black spots, spots 2 and 5 absent. Spot 1 (which is absent in one specimen) slightly closer to base than to suture, transverse, inner end broad and rounded, outer end narrowed and reaching callus or extended around posterior end of callus to near elytral margin but leaving highest point and anterior end of callus pale (in one specimen, spot 1 covers entire callus and appears to be a fascia consisting of 1+2); 1, 3, and 6 equidistant from suture; 3 transverse, inner end broader than outer end; 4 slightly wider than long, close to or on elytral margin; sometimes 3 and 4 united to form a fascia; 6 closer to elytral margin than to suture or equidistant. Pubescence yellowish, dark or black on spots or fasciae. Under side and appendages nearly concolorous with dorsum except tip of mandible, side of metasternum and part of metaepisterna black; sometimes anterior part of abdomen with some black areas.

Mandible: With a tridentate apical tooth (one and 3 dentes on upper and lower edges of median tooth respectively) and 2 lateral teeth (inner lateral tooth much smaller than outer). In addition, 2 rows of dentes each situated behind upper tooth of apical tooth along dorso-external edge of mandible and behind inner lateral tooth along inner edge of mandible. *Abdomen*: Abdominal lines complete or subcomplete, rounded, reaching to about 1/5 or 1/4 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate or broadly convex in ♂; broadly convex in ♀. Visible abdominal sternite 6 subtruncate or slightly concave in ♂; broadly convex in ♀.

Male genitalia (figs. 122–124): Aedeagus in profile, 1.93 (1.82–2.00) mm long, flattened apically, terminating in 2 adjacent points. Aedeagus from below with greatest width near apex 0.44 (0.43–0.46) mm, not quite symmetrical, gently widened from base to apex, apex open with sides somewhat angulate and terminating in 2 sharp adjacent points. One lateral edge of aedeagus slightly overlapping the other to form a longitudinal median slit (which is widely open posteriorly). Parameres each 1.52 (1.42–1.72) mm long, width near apex 0.11 (0.10–0.12) mm, slightly bent ventrad near base, with yellowish setae on about apical

half. Penis bent strongly as in fig. 124, with gonopore terminal. *Female genitalia* (fig. 157): Genital plates somewhat triangular, 1.49 (1.42–1.53) mm long, greatest width 0.42 (0.40–0.46) mm, basal angle pointed and slightly bent laterally, angle opposite longest side of genital plate rounded. Hind margin of abdominal tergite 10 convex.

Type locality: Kankau, Taiwan.

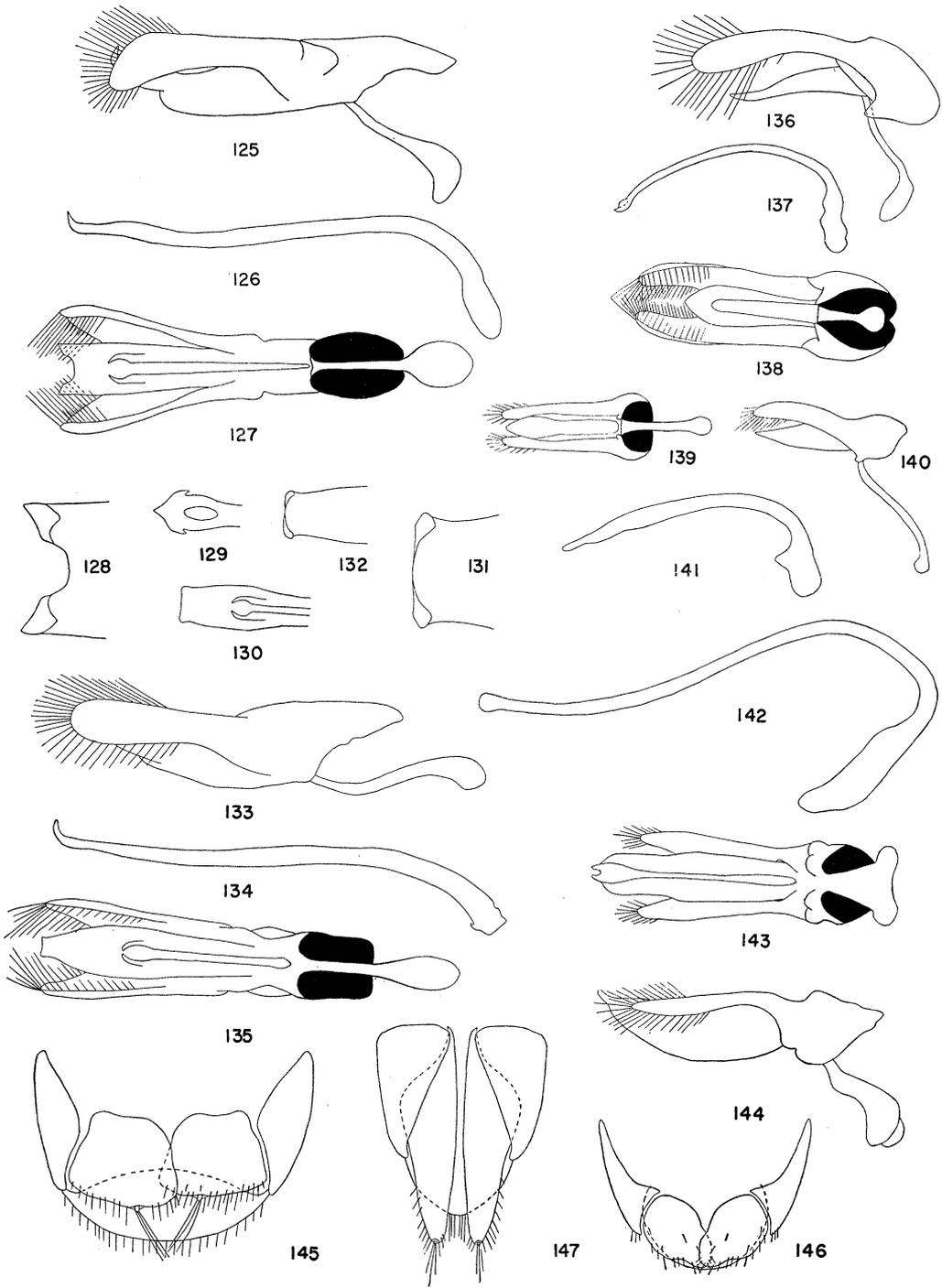
Material examined: 51 specimens (16 ♂♂, 35 ♀♀): *Taiwan*: Eboshiyama, May 1938, Hassenzan, June 1932; Hassenzan (Taichu-shu), Kahodai-Reimei, July 1932; Kanko, Sept. 1924; Kweishan, Taipei, Dec. 1947; Mt. Senjo, May 1934; Shinchiku, July 1918; Shinten, Apr. 1932; May 1940; Sozan, June 1931; Apr. 1933; June 1935; June 1936; Aug. 1938; May 1939; Taihoku, Jan. 1914; July 1924; Apr. 1933; May 1933; Apr. 1934; May 1934; May 1939; Aug. 1941; Taipeh, Apr.–June 1948; Dec. 1948; Taito, Feb.–Mar. 1919; Tsaoshan, Apr. 1958; Urai, May 1932. *Okinawa*: Naha, Okinawa, Mar. 1922.

Epilachna lata Li, n. sp. Figs. 75, 125–129.

Length: ♂ 8.9 (8.4–9.1) mm, ♀ 9.3 (8.7–9.7) mm.

Color and maculation (fig. 75): Upper side brownish red or yellowish brown. Pronotum with an obvious or faint median black spot, variable in size, closer to posterior margin than to anterior margin; sometimes with 2 additional, small, lateral black spots. Elytron with 3 black fasciae. First fascia consisting of spots 1 + 2 (which are still separated in one specimen), slightly closer to suture than to elytral margin; 2nd fascia consisting of spots 3 + 4 (which are still separated in one specimen somewhat as in fig. 79), the broader, inner end close to suture and outer end on elytral margin; 3rd fascia consisting only of spot 6, closer to suture than to elytral margin; or equidistant between suture and elytral margin or outer end on elytral margin. Inner or outer ends (or both) of fasciae 2 and 3 connected by a narrow, black strip. In two dark specimens, the inner and outer ends of all 3 fasciae are connected by a similar strip along suture and elytral margins (the black color also spreads over femora, parts of epipleura, and other areas on metasternum and abdomen.) In one of these 2 specimens (Musha, 23 May 1947, C. S. Li) a similar strip extends forward from inner ends of fascia 1 along suture and envelops scutellum (which is also somewhat black) and pronotum bears a large, median black spot and 2 additional, small, lateral black spots which are slightly united). In the other specimen (Musha, 15 May 1948, C. S. Li), a similar strip extends anteriorly and laterally behind the scutel-

Figs 125–138. 145. *Epilachna*. Figs. 139–144, 146, 147. Afidenta: 125, lateral view of ♂ genitalia of *lata*, penis removed; 126, lateral view of penis of *lata*; 127, ventral view of ♂ genitalia of *lata*, penis removed; 128, dorsal view of tip of aedeagus of *lata*, showing bent areas; 129, dorsal view of tip of penis of *lata*; 130, ventral view of aedeagus of *media*; 131, dorsal view of tip of aedeagus of *media*, showing bent areas; 132, dorsal view of tip of aedeagus of *angusta*, showing bent areas; 133, lateral view of ♂ genitalia of *angusta*, penis removed; 134, lateral view of penis of *angusta*; 135, ventral view of ♂ genitalia of *angusta*, penis removed; 136, lateral view of ♂ genitalia of *mobiliteriae*, penis removed; 137, lateral view of penis of *mobiliteriae*; 138, ventral view of ♂ genitalia of *mobiliteriae*, penis removed; 139, ventral view of ♂ genitalia of *mimetica*, penis removed; 140, lateral view of ♂ genitalia of *mimetica*, penis removed; 141, lateral view of penis of *mimetica*; 142, lateral view of penis of *arisana*; 143, ventral view of ♂ genitalia of *arisana*, penis removed; 144, lateral view of ♂ genitalia of *arisana*, penis removed; 145, ventral view of ♀ genitalia of *gressitti*; 146, ventral view of ♀ genitalia of *mimetica*; 147, ventral view of ♀ genitalia of *arisana*.



lum (its pronotum is entirely black except for a narrow strip on anterior, lateral, and sides of posterior margins). Pubescence yellowish, dark or black on fasciae or spots. Under side and appendages concolorous with dorsum except tip of mandible, part of metathoracic episterna, and hind corners of metasternum all black; mesal parts of visible abdominal sternites 1-2 or 1-3 with some black areas; and inflexed pronotum, mesothoracic episternum and epimeron, tip and side of abdomen paler.

Mandible: As in *sociolamina*. *Abdomen*: Abdominal lines subcomplete with apical edge broadly rounded to somewhat truncate, reaching to about 1/9 of distance from apical margin to base of sternite in ♀, much closer to apical margin in ♂. Mesal part of visible abdominal sternite 1 with large circular punctures. In ♂, hind margin of visible abdominal sternite 5 with broad depression, anterior edge of depression convex and close to base of sternite; in ♀, 5 with broad emargination. In ♂, visible abdominal sternite 6 with deep emargination, visible abdominal tergites 8 and part of 7 appearing through the emargination; in ♀, 6 strongly convex with slight emargination.

Male genitalia (figs. 125-129): Aedeagus in profile, 2.64 (2.53-2.72) mm long, abruptly bending dorsad at about 2/5 of length from base and bending sharply dorsad again just before end (one specimen from Hoorin has an additional small pointed process on the upper edge of aedeagus at about mid point of parameres and another specimen from Kirai has a single yellowish seta on upper edge of aedeagus). Aedeagus from below with greatest width near apex 0.54 (0.49-0.59) mm; basal part united with basal parts of parameres; a longitudinal, median slit present; slit and aedeagus itself gradually widened apically; apex of aedeagus width 0.52 (0.46-0.57) mm open, with emargination and 2 blunt, down turned points. Penis somewhat S-shaped, bent strongly just before apex; apex (from dorsal view) slightly dilated with median, sharp point bent up and 2 retrorse points on each side; gonopore elongate, situated just behind the bend (fig. 129). Parameres highly developed, each somewhat spoon-shaped; 2.14 (2.08-2.18) mm long, greatest width near apex 0.53 (0.50-0.57) mm; slightly bent ventrad at about 1/4 of length from apex, with yellowish setae on about apical 1/3. *Female genitalia*: As in *bifibra* but abdominal tergite 10 broadly convex to truncate; genital plates 0.93 (0.84-1.03) mm long, greatest width 0.43 (0.42-0.45) mm.

Holotype: ♂, Karenko, 20 July-4 Aug. 1919, T. Okuni *et al.* (in Department of Plant Pathology and Entomology, National Taiwan University, Taipei). *Allotype*, ♀, Eboshiyama, 17-21 May 1938, M. Chūjō. deposited in the same place as holotype. *Paratypes*: 1 ♂, Hoorin, 25 Dec. 1933; 1 ♂, Kirai, 7 Aug. 1934; 1 ♀, Eboshiyama, 17-21 May 1938; Musha, 2 ♀ ♀, 23 May 1937 and 15 May 1948; 1 ♀, Tai-Chung, 2 Sept. 1954.

Remarks: The male genitalia of *media*, *angusta* and this species are similar in structure except for the structure of the apex of the aedeagus. This species has a broad aedeagal tip. For characters that will separate this species from the other 2 species see remarks under *E. angusta*.

In collections we have seen 4 specimens of this species identified as *acuta* by Korschefsky. Although they are very similar in external appearance, they can be separated by the structure of the ♂ and ♀ genitalia (apex of aedeagus somewhat fork-shaped with 2 very long arms curved up just before tip in *acuta*, and aedeagus with very broad, open apex with emargination and 2 blunt points bending up in *lata*). The genital plate of *acuta* is more slender basally and much narrower apically in comparison with that of *lata*.

Epilachna media Li, n. sp. Figs. 76, 130–131.

Length: ♂ 9.0 mm.

Color and maculation (fig. 76): Upper side brown. Pronotum with a median circular black spot, closer to posterior than to anterior margin. Elytron with 5 black spots, spot 5 absent. Spots 1 and 6 slightly closer to suture than 3; 1 oval, much closer to suture than to base; 2 irregular, anterior part of callus, slightly closer to elytral margin than to base; 3 oval; 4 triangular, one side on elytral margin; 6 elongate, closer to elytral margin than to suture. Pubescence yellowish, black on spots. Under side and appendages yellowish except tip of mandible and hind corner of metasternum black.

Mandible: As in *sociolamina*. *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/7 of distance from apical margin to base of sternite. Large circular punctures and hind margins of visible abdominal sternites 5–6 as in ♂ of *lata*.

Male genitalia (figs. 130–131): Very similar to those of *lata* except for tip of aedeagus. Aedeagus 2.43 mm long in profile, greatest width near apex 0.45 mm from ventral view; apex (width 0.40 mm) somewhat truncate. Apex seen from above with 2 blunt points bending up, but bent areas smaller than those of *lata* (fig. 131). Parameres 2.00 mm long, greatest width near apex 0.47 mm. *Female genitalia*: Unknown.

Holotype ♂, Taito, 25 Feb.–27 Mar. 1919, S. Inamura (in Department of Plant Pathology and Entomology, National Taiwan University, Taipei).

Remarks: The apical width of the aedeagus is the best character for separating the 3 closely related species: *lata*, *angusta*, and this species. The apical width of aedeagus of this species is intermediate between those of the other 2 species. For other characters separating them see remarks under *angusta*.

Epilachna angusta Li, n. sp. Fig. 77–78, 132–135.

Epilachna acuta, Korschefsky (not Weise), 1933, Nat. Hist. Soc. Formosa, Trans. 23 (128–129): 300, fig. 5.

Length: ♂ 8.2 (7.5–8.9) mm, ♀ 8.8 (8.6–9.0) mm.

Color and maculation (figs. 77–78): Upper side brown or yellowish brown. In dark specimens, pronotum with a large, median, black spot and 2 additional, small, lateral black spots which are slightly united. Elytron with 3 black fasciae as in *lata*. Inner and outer ends of all 3 fasciae on suture and elytral margin respectively, and connected by a narrow black strip. A similar strip extends forward from inner ends of fascia 1 along suture and envelops scutellum, which is dark or black (in one specimen, inner and outer ends of 3 fasciae close to suture and to elytral margin except those of fasciae 2 and 3 on elytral margin; the only black strip present is between inner and outer ends of fasciae 2 and 3). In pale specimens, pronotum with a faint, median, black spot; closer to posterior margin than to anterior margin. Elytron with 4 faint black spots, except in one specimen spots 3, 4 and 6 obvious; spots 1 and 5 absent. Spot 2 small, partially on callus, about equidistant from base and from elytral margin; 3 and 6 about equidistant from suture; 3 transversely elongate; 4 close to or touching elytral margin; 6, longest, closer to suture than to elytral margin or vice versa or equidistant. Pubescence yellowish, dark or black on spots or fasciae. Under side and appendages in dark specimens concolorous with those of

lata; in pale specimens, also concolorous with those of pale specimens of *lata* except more black areas on metasternum, mesal part of visible abdominal sternites 1-2 or 1-3 paler in some specimens.

Mandible: As in *sociolamina*. *Abdomen*: Abdominal lines subcomplete, rounded or broadly rounded, reaching to about 1/5 to 1/9 of distance from apical margin to base of sternite. A longitudinal depression on each side of abdomen in ♂. Large circular punctures and hind margins of visible abdominal sternites 5-6 in both sexes as in those of *lata*, the broad depression obscure on hind margin of 5 in ♂.

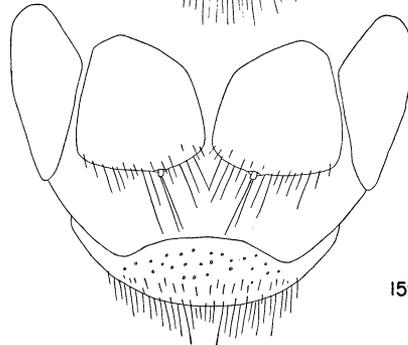
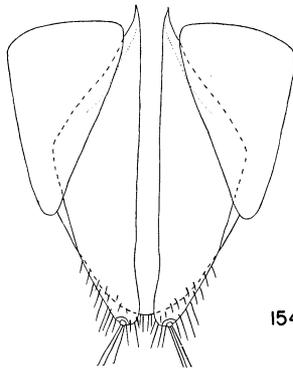
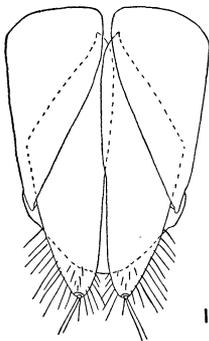
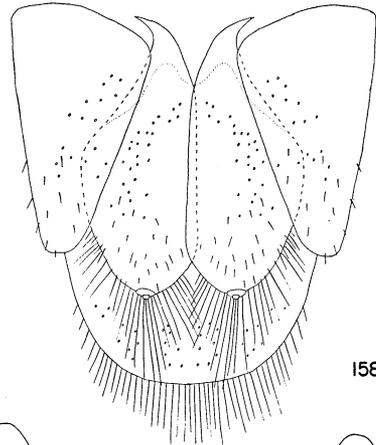
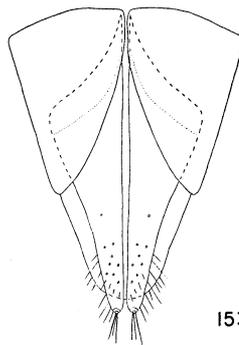
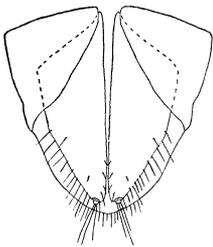
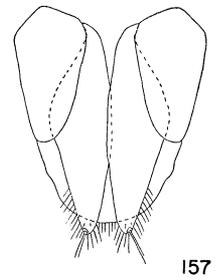
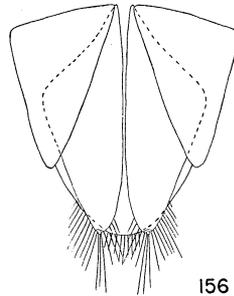
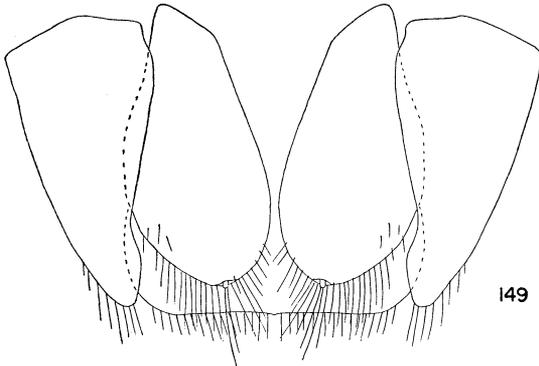
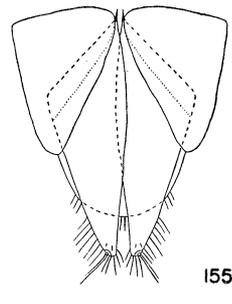
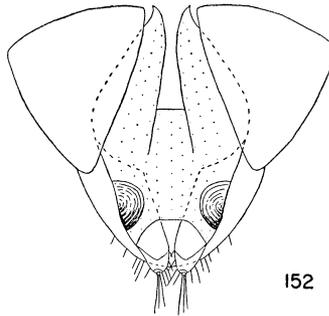
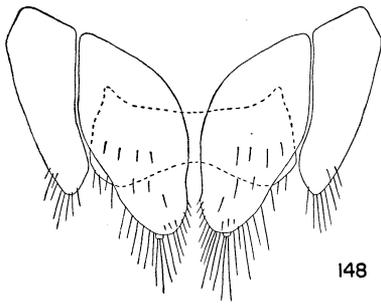
Male genitalia (figs. 132-135): Somewhat similar to those of *lata* except aedeagus, seen in profile, 2.52 (2.05-2.88) mm long, bending more smoothly dorsad at about 2/5 of length from base, with few yellowishish setae scattered on upper edge; parameres each 1.81 (1.57-2.05) mm long, greatest width near apex 0.47 (0.38-0.50) mm, round at apex and with yellowish setae on about apical 1/2. Aedeagus from below with greatest width near apex 0.51 (0.48-0.53) mm; apex narrow (width 0.18 (0.14-0.23) mm), with very slight emargination. Apex from above, with 2 sharp points bent dorsad (fig. 132). Penis bent slightly dorsad near base and strongly just before apex; apex blunt with elongate gonopore situated dorsally just behind bend. *Female genitalia*: As in *bifibra*, genital plates 0.95 (0.91-0.97) mm long, greatest width 0.41 (0.39-0.42) mm. Hind margin of abdominal tergite 10 subtruncate without emargination.

Holotype ♂ (BISHOP 3006), Musha, 15 May 1948, C. S. Li. *Allotype*, ♀, Arisan, 2-23 Oct. 1918, J. Sonan (in Department of Plant Pathology and Entomology National Taiwan Univ., Taipei). *Paratypes*: Arisan, 2-23 Oct. 1918; June 1914; Chi-tou, Nan-tou, 23 July 1955; Hassenzan, 24 June 1934; Musha, 22 May 1947, 25 June-5 July 1947; Taito, 7 June 1914. All Taiwan.

Remarks: This species has a narrow aedeagal tip in comparison with that of *lata* and of *media*. *E. bifibra*, *lata*, *media*, and this species are very closely related; *bifibra* ♀♀ can be distinguished from the other 3 species by the bilobed visible abdominal sternite 6, with a deep notch between the lobes. *E. angusta* males can be separated from ♂♂ of *lata* and *media* by the narrow aedeagal apex (width 0.18 (0.14-0.23) mm) with 2 sharp points bent up, with a very small bent area (fig. 132); with apex of the penis blunt, not dilated and without the 2 retrorse points on each side. The ♀♀ of *E. angusta* have a longitudinal, median, shallow groove on visible abdominal sternite 6. *E. lata* and *media* can be distinguished by the structure of the apex of the aedeagus: apex 0.52 (0.46-0.57) mm in width, with emargination and large apical, dorsal, bent area in *lata* (fig. 128); apex 0.40 mm in width, without emargination, somewhat truncate and with small bent area in *media* as in fig. 131.

In collections we have seen 2 specimens of this species identified as *E. decipiens* ab. ? and *E. acuta* ab. ? by Korschefsky. These 2 species are quite distinct from *E. angusta*. We have seen the type (♂) of *E. decipiens* Crotch from the Museum of Zoology, University of Cambridge. It is very different from *E. angusta* and can be easily recognized by its

Figs. 148-159. *Epilachna*, ventral view of ♀ genitalia: 148, *admirabilis*; 149, *maxima*; 150, *maculicollis*; 151, *flavicollis*; 152, *sociolamina*; 153, syntype of *decemguttata*; 154, *longissima*; 155, *confusa*; 156, *chinensis*; 157, *sauteri*; 158, *bifibra*; 159, *mobiliteriae*.



semi-spherical form (*E. angusta* is oval in form), by the presence of 6 spots on each elytron, by the broadly convex visible abdominal sternite 5 and by having 6 deeply emarginate and almost entirely covered by 5. For the genital characters of *angusta* that will separate it from *acuta* see remarks under *lata*.

***Epilachna bifibra* Li, n. sp. Figs. 79, 158.**

Length: ♀ 9.0 (8.9–9.1) mm.

Color and maculation (fig. 79): Upper side brownish red. Pronotum with a small, median black spot closer to posterior margin than to anterior margin. Elytron with 5 black spots, spot 5 absent. Spots 1 and 3 elongate, close to suture; 2 elongate, close to suture; 2 elongate, close to elytral margin, its anterior 1/2 on or just behind callus; 1 and 2 separated (somewhat as in fig. 76) or united to form a transverse fascia; 4 elongate, on elytral margin; and 6, the longest, with both ends pointed, and equidistant from suture and from elytral margin. Pubescence yellowish, black on spots. Under side and appendages concolorous with dorsum except tip of mandible and hind corner of metasternum black, sides of visible abdominal sternite 1–2 with somewhat black transverse strips, lateral margin and tip of abdomen brownish.

Mandible: As in *sociolamina*. *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/7 of distance from apical margin to base of sternite. Mesal part of visible abdominal sternite 1 with large circular punctures. Hind margin of visible abdominal sternite 5 broadly convex, with a broad emargination. Visible abdominal sternite 6 bilobed, with a deep notch between the lobes.

Male genitalia: Unknown. *Female genitalia* (fig. 158): Shape of genital plates as in fig. 158 (the shapes of genital plates are very similar in *lata*, *angusta*, and this species. The length, width, and shape of genital plate seem to vary gradually. The figure is more or less intermediate), pointed at base, 0.87 (0.86–0.88) mm long, greatest width 0.41 (0.40–0.42) mm. Hind margin of abdominal tergite 10 subtruncate, with or without a slight emargination.

Holotype, ♀, Tai-Chung, Taiwan, 2 Sept. 1954, F. Y. Yu. (in Department of Plant Pathology and Entomology, National Taiwan Univ., Taipei). *Paratype*, 1 ♀, Antung, 2 Aug. 1929, Y. Miwa.

Remarks: The ♀ of this species can be recognized by the bilobed visible abdominal sternite 6 with a deep notch between the lobes.

This species is very similar to *convexa*, *lata*, *media*, and *angusta* in external appearance. We have examined a paratype (♀) of *convexa* and these can be easily distinguished by the following characters: *E. bifibra* has the upper side brownish red in color, a small median black spot on pronotum, large circular punctures (as in *admirabilis*) on the mesal part of visible abdominal sternite 1, and wider genital plates. *E. convexa* has the upper side pale yellowish brown in color, a large median black spot and 2 smaller lateral spots on pronotum, fine punctures (approximately the same size as those on other visible abdominal sternites) on visible abdominal sternite 1, and narrower genital plates. For the characters separating this species from *lata*, *media*, and *angusta* see remarks under *angusta*.

Epilachna mobiliteriae Li, n. sp. Figs. 80, 136–138, 159.

Length: ♂ 6.7 (6.5–7.0) mm, ♀ 7.4 (7.0–7.7) mm.

Color and maculation (fig. 80): Upper side brick red or brownish red. Pronotum with an obvious or faint median black spot, this spot closer to posterior margin than to anterior margin. Elytron with 6 black spots, spot 3 rarely absent, shape and size of spots variable. Spots 1 and 5 equidistant from suture; 6 more remote; 1 closer to suture than to base; 2 closer to elytral margin than to base or equidistant between margin and base, its anterior part on callus; 2 closer to base than 1; 3 situated among 1, 2, 4, and 5, closer to suture and base than to elytral margin and apex respectively; 3 reduced to small size or absent or united with 4 (each condition present in one of available specimens); 4 situated on or closer to elytral margin; 6 closer to elytral margin than to suture or vice versa, or equidistant. Pubescence yellowish; black on spots. Under side and appendages concolorous with dorsum except tip of mandible and hind corner or largest part of metasternum black, mesal part of abdomen with or without some black areas, side and tip of abdomen paler.

Mandible: As in *sociolamina*. *Epipleura*: As in *gressitti*. *Abdomen*: Abdominal lines and large circular punctures as in *gressitti*. Hind margin of visible abdominal sternites 5–6 broadly convex, more convex in ♀ than in ♂; 6 with deep emargination in ♂, and completely covered by 5 in both sexes.

Male genitalia (figs. 136–138): Phallobase highly developed. Aedeagus flattened in profile, especially near apex, 1.06 (1.03–1.10) mm long, its base slightly covered by edges of parameres, gently bending ventrad and slightly dorsad just before tip, terminating in a sharp point; aedeagus from below, gradually widening from base for about 3/4 of its length, width at this point about 0.31 (0.29–0.32) mm, abruptly narrowed posteriorly to a blunt point. Parameres well developed; each 1.37 (1.28–1.47) mm long, greatest width near apex 0.22 (0.17–0.27) mm gently bending ventrad, slightly widening, and with pale yellowish setae, in apical 1/2. Penis bent ventrad near base and very slightly bent dorsad just before tip; gonopore situated dorsally just before tip. *Female genitalia* (fig. 159): Genital plates somewhat similar to those of *gressitti* but more convex basally and longer; 0.45 (0.43–0.46) mm long, greatest width 0.44 (0.43–0.45) mm. Abdominal tergite 10 with its most dorso-mesal part membranous, its apical part folded ventrally and over for about 0.29 (0.28–0.33) mm.

Holotype, ♂, Kuaru (Kuraru), Taiwan, 14 June 1937, M. Chûjô (in Dept. of Plant Pathology and Entomology, National Taiwan Univ., Taipei). *Allotype* ♀, Kuaru, 14 June 1937 Y. Miwa (deposited with holotype). *Paratypes*: 1 ♂, Hokuto, 31 Jan. 1931; 1 ♂, Horisha, May–Aug. 1918; 1 ♂, Rikiriki, 23 Mar. 1924; 1 ♂, Rokki, 15 June 1932; 1 ♀, Chirifu, 18 May 1934; 1 ♀, Taipei, 20 July 1940.

Remarks: Spot 3 of this species may be present or absent as described above. This species is closely related to *gressitti* but can be easily separated on the basis of external characters. In collections we have seen 2 specimens of this species identified as *grayi* Muls. ab. and *Henosepilachna indica* (Muls.) by Korschefsky and Yoshida. *E. mobiliteriae* can be distinguished from these 2 species by its elytral grooves or cavities.

Epilachna gressitti Li, n. sp. Figs. 81, 145.

Length: ♀ 6.7 (6.5–7.1) mm.

Color and maculation (fig. 81): Upper side brick red or reddish brown. Pronotum with a large, somewhat pentagonal, median black spot and 2 smaller, lateral, black spots; median spot touching posterior margin, close to anterior margin (in one specimen, pronotum entirely black leaving anterior and lateral margins pale). Elytron with 3 black fasciae. First basal fascia consisting of spots 1+2, closer to suture than to base, touching elytral margin, and extending posteriorly along suture. Scutellum same color as elytron (black in one specimen in which scutellum was abnormally developed). Second mesal fascia consisting of 3+4+5, extending posteriorly to form a "V", closer to suture than 1st basal or 3rd apical fasciae, and touching elytral margin. Spot 6 extended and touching elytral margin to form 3rd, apical fascia. Elytral margins dark or black between all 3 fasciae (in one specimen, the inner ends of 3 fasciae are connected by a narrow black strip). Pubescence yellowish, black on fasciae. Under side and appendages concolorous with dorsum except tip of mandible and most of metasternum black; epipleura, mesothoracic episterna, femora, and mesal part of abdomen with dark or black areas.

Mandibles: As in *sociolamina*. *Epipleura*: Epipleura each with 2 grooves or cavities for reception of tips of middle and hind femora. *Abdomen*: Abdominal lines incomplete, apical edge somewhat parallel to apical margin of sternite, reaching 1/8 of distance from apical margin to base of sternite. Mesal part of visible abdominal sternite 1 with large circular punctures (as in *admirabilis* and *bifibra*). Hind margin of abdominal sternites 5-6 broadly convex in ♀, 6 completely covered by 5.

Male genitalia: Unknown. *Female genitalia* (fig. 145): Genital plates each somewhat trapezoidal, 0.41 (0.40-0.42 mm long, greatest width 0.43 (0.40-0.44) mm. Abdominal tergite 10 with its most dorso-mesal part membranous, its apical part folded ventrally and over for about 0.28 (0.25-0.30) mm.

Holotype, ♀, (CAS) Musha (Wushe), Taiwan, 18 May 1932, J. L. Gressitt. *Paratypes*, 1 ♀, Musha, 14 May 1948; 1 ♀, Wushe, Tai-Chung, 3 Aug. 1955 F. Y. Yen and F. L. Yu.

Remarks: This species is dedicated to the collector, Dr. L. Gressitt. It is closely related to *mobiliteriae*, *chapini*, *magna*, and *militaris*. These can be easily separated by differences in maculation.

Genus *Afidenta* Dieke

Afidenta Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 109.

Type Species: *A. mimetica* Dieke.

The description of this genus is also made in comparison with that of *Henosepilachna*. If the characters are the same as those of *Henosepilachna*, they are not usually redescribed.

Length: ♂ 4.7 (3.8-5.6) mm, ♀ 5.0 (4.2-6.0) mm. Coloration brownish red or brownish yellow.

Head: Basic structure of mandibles as in *Henosepilachna*, except in *arisana* there is only one lateral tooth. Maxillae and labium as in *Henosepilachna*, except in *arisana* the galea is dilated forming a rounded apex and ligula is conical with a rounded apex. *Thorax*: Anterior margin of pronotum concave or deeply concave. Pronotum spotless, or with a transverse row of 2 or 4 equidistant black spots near middle, or with a transverse median black spot, variable in size (in one extreme case pronotum almost entirely black

leaving narrow lateral and posterior margins pale). *Elytron*: Apical angle rounded. Basic elytral maculation of *A. mimetica* is as in *Henosepilachna* but in *A. arisana* there are only five black spots, spot 5 is absent. Positions of these five spots are somewhat as in 10-spotted species of *Epilachna*. *Legs*: Basal tooth of tarsal claws with an irregular, uniformly sclerotized outside edge in *A. mimetica*; in *A. arisana* this is triangular as in *Henosepilachna*. *Abdomen*: Abdominal lines subcomplete, rounded or nonangulate, reaching to about 1/5 or 1/6 of distance from apical margin to base of mesal part of visible abdominal sternite 1. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly and slightly convex or truncate in ♀. Visible abdominal sternite 6 emarginate or convex (very slightly convex in the middle) in ♂; convex but not split in ♀.

Male genitalia: In *A. mimetica* about same size as those of *Epilachna microgenitalia* but those of *A. arisana* larger than in many species of *Henosepilachna* and *Epilachna*. Phallobase short, with a longitudinal, dorsal, median suture. Upper side of aedeagus with neither setae nor a basal knife edge. No apical thorn on apices of parameres. Apodeme of phallobase not laterally compressed. *Female genitalia*: Very different in the 2 species in this genus from Formosa. Genital plates somewhat diagonally suboval in *mimetica* while they are triangular in *arisana*. Neither species has a notch on inner edge near base. Hind margin of abdominal tergite 10 convex.

Remarks: Whether *Afidenta* is a good genus or not is open to discussion. Dieke (1947) proposed it as a new genus including 2 known species, *mimetica* and *minima* (in addition, *bisquadripunctata* Gyllenhal has been temporarily placed in this genus by Dieke, but it differs in some respects from these 2 species). He described the genus as follows: "Claws bifid with a sharp basal tooth. Sixth abdominal segment of female not split lengthwise." He also mentioned that the size of the genitalia of these two species is much smaller relative to the body size than in other species of *Henosepilachna* and *Epilachna*. He states further: "the structure of the tooth of the claw differs from that of *Epilachna* [i. e. *Henosepilachna*] in that it has an irregular, weakly sclerotized, outside edge." However we have found that in *mimetica*, the outside edge of the basal tooth is uniformly sclerotized as in the other parts. In addition, size of body and ♂ genitalia are about the same as those of *E. microgenitalia*. Furthermore, presence of basal tooth and absence of splitting of visible abdominal sternite 6 of ♀ would put *arisana* and *sanscrita* (see remarks under *A. arisana*) in the genus *Afidenta*. But in *arisana* and *sanscrita* the basal tooth is triangular as in *Henosepilachna*, the triangular ♀ genital plates like those of most *Epilachna* are different from those of *mimetica* and *minima* Dieke, and in *A. arisana* the ♂ genitalia are larger than in many species of *Henosepilachna* and *Epilachna*.

The presence of a basal tooth on each tarsal claw and the undivided visible abdominal sternite 6 of ♀ of *mimetica* and *arisana* prohibits placing these species either in *Henosepilachna* or in *Epilachna*. For the present, it seems best to continue to recognize this genus for the reception of these 2 species as well as *minima* Dieke, *sanscrita* (Crotch) and *bisquadripunctata* (Gyll.).

KEY TO TAIWAN SPECIES OF AFIDENTA

Body rounded; pronotum with a transverse row of 2 or 4 rounded black spots near middle, or spotless; elytron with 6-14 black spots, some spots occasionally coalescing: 1+3, 3+4, or 5+6 **mimetica**

Body oval; pronotum with a transverse median black spot, variable in size; elytron with 5 black spots (spot 5 absent), sometimes 1 and 2 slightly united, spots 3 and 6 transverse..... **arisana**

Afidenta mimetica Dieke Figs. 82-83, 139-141, 146.

Henosepilachna 28-punctata, Weise (not Fabricius), 1923, Archiv Naturg. **89** A (2): 128.

Afidenta mimetica Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 110, figs. 74, 157, 201.

A. mimetica simplex Dieke, *l. c.*, 111. **New Synonymy.**

Length: ♂ 5.2 (4.3-5.6) mm, ♀ 5.5 (5.1-6.0) mm.

Color and maculation (figs. 82-83): Upper side brownish red. Pronotum with a transverse row of 4 equidistant, black, rounded spots near middle, median 2 slightly closer to anterior than posterior margin, these 4 spots sometimes faint, sometimes only median 2 present or spots entirely absent. Elytron may have only 6 black, persistent spots arranged as in fig. 82. In addition, 1-8 black, nonpersistent spots variably present; when all are present the 14 spots arranged as in fig. 83 and similar to those of *Henosepilachna sparsa* (Herbst) or other 28-spotted *Henosepilachna* species (in specimens from mainland China, all 28 spots are usually present but c, f, and h are occasionally absent; a and b are slightly united in one specimen). Persistent and nonpersistent spots variable in size but the former usually are bigger than the latter. Spots c, b 3, and d not lying on a straight line. In specimens having fewer than 28 spots, some spots occasionally coalescing: 1 + 3, 3 + 4, or 5 + 6 (in one specimen, 2 and 4 are connected by a narrow black strip near elytral margin). Pubescence yellowish, dark on spots. Under side and appendages paler than dorsum except tip of mandible and side of posterior part of metasternum black, abdomen with some black areas, sometimes also pale, sometimes metasternum and abdomen all pale.

Mandible: With a tridentate apical tooth (upper and median teeth of apical tooth are deeply separated) and 2 lateral teeth, inner one smaller. In addition, a number of dentes of various sizes situated between teeth, and behind inner lateral tooth along inner edge of mandible, except only one dens at bottom between upper and median teeth of apical tooth (these dentes and lower tooth of apical tooth are usually worn off in old individuals). *Elytron*: Tip rounded. *Abdomen*: Abdominal lines subcomplete, nonangulate, reaching to about 1/5 or 1/6 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly and slightly convex in ♀. Visible abdominal sternite 6 emarginate in ♂; convex but not split in ♀.

Male genitalia (figs. 139-141): Aedeagus in profile, 0.43 (0.40-0.48) mm long, somewhat wedge-shaped, without basal knife edge, with upper edge nearly straight and lower edge slightly bent up at about apical 1/2, apex terminating in a sharp point. Aedeagus from below with width in middle 0.11 (0.11-0.12) mm, nearly same width from base to about 2/3 of length from base and abruptly narrowed to a blunt point posteriorly. Basal part of aedeagus with a narrow but completely fused area, a wide, longitudinal, median slit present posteriorly. Parameres each 0.44 (0.41-0.46) mm long, width in middle 0.08 mm, without apical thorn, slightly bent up at base, with yellowish setae on about apical 1/2. Penis slightly bent near base, narrowed near apex, with elongate, oval gonopore located dorsally just before apex. *Female genitalia* (fig. 146): Genital plates each 0.33 (0.30-0.35) mm long, greatest width 0.23 (0.20-0.26) mm, somewhat diagonally suboval, slightly emarginate on

inner and outer apical sides. Hind margin of abdominal tergite 10 convex.

Type and type locality: Indochina: Annam Prov., Haut Donai, Col de Blao, alt. 900 m, 30 Sept. 1932, M. Poilane (in U. S. Nat. Mus., No. 57135).

Material examined: 90 specimens (46♂♂, 45♀♀): Holotype, ♂, Paratype, 1♀, Tai-pingshien, Anhwei, China, 1932, G. Liu (MCZ No. 29650). *Taiwan*: Chao-Chi, I-lan, 16 May 1950; Hori, May 1935; Kanshirei, 2–14 June 1908; Karenko, 20 July–4 Aug. 1919; Koshun, 5 Apr. 1940; Shinten, 20 May 1921; Taihoku, 1 July 1913; 5 July 1913; Apr. 1914; 11 May 1934; 30 Mar. 1941; Taihorinsho, Aug. 1909; Taito, 25 Feb.–27 Mar. 1919; Teraso, Feb. 1909; Bui Tau, 1 June 1928. *Mainland China*. Chekiang Prov.: Hangchow, 9 Oct. 1921; 18 May 1923; Fukien Prov.: Foochow, 15 July 1929; Kiangsi Prov.: Sunwu, July 1936; Kouy-Tcheou, Kouy Yang Fou. Kwangtung Prov.: Canton, July 1918; Hsu-leng, Tin-tong, Loh-chang Dist., 1 Aug. 1947; Meihsien, 29 May 1936; Tai-yong, 6 Aug. 1936; Tsin-leong Shan, 5 June 1936; Fukien: Yen-ping, spring 1915.

Remarks: Dieke (1947) indicated that the hind margin of visible abdominal sternite 5 is very slightly convex in ♂; 6 convex in ♂, and emarginate, not split in ♀. We have examined his holotype, one of his paratypes and 13 specimens determined by him, but the hind margins of 5 in ♂, and 6 in both sexes, do not agree with his description.

Dieke (1947) also described a 12-spotted form of this species as a subspecies, *mimetic simplex*. We have found that the 12-spotted form, the 28-spotted form and many intermediate forms (i. e. one or more nonpersistent spots are variably present) all occur in Formosa. These are only spot variations and it is not reasonable to regard this as a subspecies.

In collections we have found 5 specimens of this species identified as *Henosepilachna sparsa orientalis* (Dieke), *H. 28-punctata* (Fabricius), *E. chinensis* (Weise) and *Scymnus akonis* Ohta by Chapin, Korschefsky, Weise and two unknown authors. This species can be separated from the 28-spotted *Henosepilachna* species by the shape of the ♀ visible abdominal sternite 6 and ♂ and ♀ genitalia. They can be distinguished from *E. chinensis* by their maculation and from *S. akonis* by the subfamily characters.

***Afidenta arisana* Li, n. sp.** Figs. 84–85, 142–144, 147.

Solanophila elvina, Korschefsky (not Mulsant), 1933, Nat. Hist. Soc. Formosa, Trans. 23 (128–129): 301.

Length: ♂ 4.1 (3.8–4.4) mm, ♀ 4.4 (4.2–4.7) mm.

Color and maculation (figs. 84–85): Upper side brownish yellow. Head spotless, occasionally with black areas. Pronotum with a transverse median black spot, slightly closer to anterior than to posterior margin, variable in size (in one extreme case, pronotum almost entirely black leaving narrow lateral and posterior margins pale). Elytron with 5 black spots, spot 5 absent. Spots 1 and 3 closer to suture than 6; 1 somewhat oval, anterior end close to or sometimes almost touching base, inner, anterior edge slightly closer to suture than to inner, posterior edge and sometimes inner edge touching suture; 2 close to or sometimes touching base and elytral margin, anterior part on callus; sometimes 1 and 2 slightly united; 3 obliquely transverse, near suture, inner posterior edge slightly closer to suture than to inner anterior edge and sometimes inner edge touching suture; 4 close to or

sometimes touching elytral margin; 6 transverse, closer to suture than to elytral margin or vice versa or equidistant. Pubescence yellowish, dark on spots. Under side and appendages concolorous with dorsum except tip of mandible, pro-, meso-, meta-sternum, meso-, meta-pleura black in varying degrees; abdomen also black but side and apex light; epipleuron and femora with some black areas.

Mandible: With a tridentate apical tooth, one lateral tooth and 3 additional small teeth: 1st elongate, situated at base between upper and median teeth of apical tooth; 2nd and 3rd teeth situated respectively near upper and lower surfaces of base of lateral tooth, 2nd smaller. Besides these, a row of dentes located on upper and lower edges of upper and median teeth of apical tooth respectively, and behind lateral tooth along inner edge of mandible (these dentes are usually worn off in old individuals). *Abdomen*: Abdominal lines subcomplete, rounded, reaching to about 1/5 of distance from apical margin to base of sternite. Hind margin of visible abdominal sternite 5 truncate in ♂; broadly and slightly convex or truncate in ♀. Visible abdominal sternite 6 convex, very slightly concave in middle in ♂; convex but not split in ♀.

Male genitalia (figs. 142-144): Aedeagus in profile, 0.77 (0.74-0.81) mm long, laterally compressed; upper edge with 2/3 of length from base nearly straight and slightly bent up posteriorly, lower edge arch-shaped, apex terminating in a point. Aedeagus from below with width in middle 0.17 (0.17-0.18) mm, basal part slightly covered by basal parts of parameres, with about 2/5 of length from apex slightly narrowed, apex terminating in 2 adjacent points. Parameres each 0.66 (0.63-0.69) mm long, greatest width near middle 0.05 (0.05-0.06) mm, very slightly bent ventrad near base, slightly dilated in middle and narrowed again near apex, with yellowish setae on about apical 1/2. Penis bent strongly near base as in fig. 142, slightly dilated apically, gonopore terminal. *Female genitalia* (fig. 147): Genital plates each 0.74 (0.67-0.81) mm long, greatest width 0.20 (0.18-0.22) mm, triangular with basal angle pointed and angle opposite longest side rounded. Hind margin of abdominal tergite 10 convex.

Holotype ♂ (BISHOP 3007), Arisan, 28 July 1947, C. S. Li. *Allotype* ♀ (BISHOP), same data as holotype. *Paratypes*: Arisan, 10 Oct. 1912; June 1914, Dec. 1915; 6 June 1932; 28-30 July 1947, 24 May 1933; Taito, 25 Feb.-27 Mar. 1919; Taitung, 1-10 May 1948; Wushe, 22 May 1947. All Taiwan.

Remarks: Most of the specimens of this species were collected in Arisan. In collections we have seen 9 specimens of this species identified as *Epilachna dumerili* Muls., *E. elvina* Muls. and *E. formosana* (Ws.) by Shiraki and Korschefsky (one *E. elvina* and one *E. formosana* from Korschefsky's collection were possibly identified by him). This species can be separated from the above mentioned species by the generic characters.

This species is closely related to *Afidenta sanscrita* (Crotch) and they are very similar externally. We have seen the type (♀) of *A. sanscrita* from the Museum of Zoology, University of Cambridge. The type has the basal tooth on the tarsal claws and visible abdominal sternite 6 is not divided. It should, therefore, be transferred from *Epilachna* to *Afidenta*. *A. arisana* and *A. sanscrita* can be distinguished externally by the length (3.8-4.7 mm long in *arisana* and 5.1 mm long in *sanscrita*) and the maculation (in *arisana*, spots 3 and 6 transverse and the callus is entirely covered by the anterior part of the spot 2; in *A. sanscrita*, spots 3 and 6 are not transverse and the tip of spot 2 touches the posterior end of the callus).

LIST OF GENERA AND SPECIES OF EPILACHNINAE
RECORDED FROM TAIWAN

From the literature up to February 1959, we have found 2 genera, 26 species, 1 variety and 2 aberrations of Epilachninae recorded as occurring in Formosa as follows:

Genus *Henosepilachna*

- | | |
|-----------------------------------|--|
| 1. <i>H. indica</i> (Mulsant) | 4. <i>H. vigintioctomaculata</i> (Motschulsky) |
| var. <i>ceylonica</i> (Weise) | 5. <i>H. vigintioctopunctata</i> (Fabricius) |
| 2. <i>H. semifasciata</i> (Dieke) | 6. <i>H. wissmanni</i> (Mulsant) |
| 3. <i>H. subfasciata</i> (Weise) | ab. <i>processa</i> (Weise) |

Genus *Epilachna*

- | | |
|--|---------------------------------------|
| 7. <i>E. acuta</i> (Weise) | 17. <i>E. fallax</i> (Weise) |
| 8. <i>E. admirabilis</i> Crotch | 18. <i>E. formosana</i> (Weise) |
| 9. <i>E. alternans</i> Mulsant | 19. <i>E. incauta</i> Mulsant |
| 10. <i>E. decemmaculata</i> Redtenbacher | 20. <i>E. longissima</i> (Dieke) |
| 11. <i>E. dumerili</i> Mulsant | 21. <i>E. macularis</i> Mulsant |
| 12. <i>E. grayi</i> Mulsant | 22. <i>E. maculicollis</i> (Sicard) |
| ab. <i>zebra</i> Sicard | 23. <i>E. maxima</i> (Weise) |
| 13. <i>E. chinensis</i> (Weise) | 24. <i>E. octomaculata</i> (Thunberg) |
| 14. <i>E. decemguttata</i> (Weise) | 25. <i>E. saginata</i> (Weise) |
| 15. <i>E. decipiens</i> Crotch | 26. <i>E. sauteri</i> (Weise) |
| 16. <i>E. elvina</i> Mulsant | |

E. chinensis and *E. maxima* which have been seen in some collections were identified by Korschefsky in 1937 and 1938. *E. decemmaculata* from his collection was possibly also identified by him.

In the above list, *H. subfasciata* and *E. macularis* were not observed by us. We have found *H. semifasciata*, *E. angusta*, *E. admirabilis*, *E. maxima*, and *Afidenta arisana* misidentified as *H. indica* var. *ceylonica*, *E. acuta*, *E. grayi* and *E. grayi* ab. *zebra*, *E. saginata*, and *E. elvina* respectively by Korschefsky; *E. admirabilis*, *E. maculicollis*, and *A. mimetica* misidentified as *E. alternans* and *E. grayi*, *E. fallax*, and *H. vigintioctopunctata* respectively by Weise. Therefore, they were erroneously recorded in Formosa as a result of these misidentifications. In collections we have seen not a few specimens of *H. sparsa*, *H. boisduvali*, *E. admirabilis*, *E. sociolamina*, *E. confusa*, *E. angusta*, *E. mobilitertiae*, *E. crassimala*, and *A. arisana* that were misidentified as *H. indica*, *H. indica* var. *ceylonica*, *H. vigintioctopunctata*, *E. octomaculata*, *E. dumerili*, *E. decemmaculata*, and *E. decipiens* by Korschefsky, Weise and other authors. Probably *H. indica* has been confused with *H. sparsa*, *H. boisduvali*, and *E. mobilitertiae*; *H. indica* var. *ceylonica* confused with *H. sparsa* and *E. crassimala*; *H. vigintioctopunctata* confused with *H. sparsa* and *H. boisduvali*; *E. octomaculata* confused with *E. admirabilis*; *E. dumerili* confused with *E. sociolamina* and *A. arisana*; *E. decemmaculata* confused with *E. confusa*; *E. decipiens* confused with *E. angusta*. *E. macularis* was also possibly confused with *E. admirabilis* owing to almost exactly identical maculations.

In this paper 3 genera and 30 species have been recorded in the subfamily Epilach-

ninae, of which one genus and 12 species are described as new and one genus (*Afidenta*) and five species (*H. sparsa*, *H. pusillanima*, *H. boisduvali*, *E. flavicollis*, and *A. mimetica*) are new records in Taiwan.

LITERATURE CITED

- Chevrolat, A. 1837. In Dejean's "Catalogue des Coléoptères..." Chez Mequignon-Marvis pere et fils, Paris, ed. 3, 5: 460-461.
- Crotch, G. R. 1874. A revision of the coleopterous family Coccinellidae. E. W. Janson, 28, Museum Street, London. XV, 311 pp.
- Dieke, G. H. 1947. Ladybeetles of the genus *Epilachna* (sens. lat.) in Asia, Europe, and Australia. Smithsonian Misc. Collect. 106 (15): 1-183, 27 pls., 226 figs.
- Dobzhansky, T. 1926. Les organes genitaux des Coccinellidae comme caractère taxonomiques. Acad. Sci. URSS, Bull. ser. 6, 20: 1385-94, 1555-86, 2 pls.
- Fauvel, P. A. 1903. Mission de M. Maurice Maindron dans l'Inde meridionale. Revue d'Ent. 22: 320.
- Gilbert, E. E. 1952. The homologies of the male genitalia of Rhynchophora and allied Coleoptera. Ent. Soc. Amer., Ann. 45 (4): 633-7, 8 figs.
- Gorham, H. S. 1901. Erotylidae, Endomychidae and Coccinellidae of Sumatra. Stett. Ent. Ztg. 62: 212.
- Herbst, J. F. W. 1786. Erste Mantisze zum Verzeichniss der ersten Klasse meiner Insektenammlung. Fuessly's Archiv der Insectengesch. 7-8: 160, pl. 43, fig. 11.
- 1793. Natursystem aller bekannten in- und ausländischen Insekten. Die Käfer. Pt. 5, p. 282, t. 56, fig. 8.
- Hope, F. W. 1840. Coleopterist's manual. J. C. Bridgewater, South Molton Street; and Bowdery and Kerby, Oxford Street, London. vol. 3, p. 157.
- Horn, W. and I. Kahle. 1935-1937. Über entomologische Sammlungen, Entomologen und Entomo-Museologie. R. Friedländer und Sohn, Berlin NW 7, Karlstrasse 11, Germany.
- Kapur, A. P. 1950. The biology and external morphology of the larvae of Epilachninae (Coleoptera, Coccinellidae). Bull. Ent. Res. 41: 161-208.
- Kono, H. 1936-1937. Eine neue Epilachna-Art. Ins. Matsumurana 11: 99, fig. 1.
- Korschefsky, R. 1931. In Junk's Coleopterorum catalogus. Coccinellidae I. W. Junk, Berlin, 118: 1-76.
- 1933. Bemerkungen über Coccinelliden von Formosa. Nat. Hist. Soc. Formosa, Trans. 23 (128-129): 299-302, 17 figs.
- Kurisaki, M. 1924. On the number of the abdominal segments and the external differences between female and male of coccinellids. Sapporo Nat. Hist. Soc., Trans. 9 (1): 141-7, 1 pl.
- Lewis, G. 1896. On the Coccinellidae of Japan. Ann. Mag. Nat. Hist. ser. 6, 17: 23-4.
- Lindroth, C. H. 1957. The principal terms used for male and female genitalia in Coleoptera. Opuscula Ent. 22 (2/3): 241-56.
- Liu, C. 1935. A check list of Coccinellidae of China. Ent. and Phytopath. 3: 294-304.
- Mader, L. 1926-1937. Evidenz der palaearktischen Coccinelliden. I. Teil, pp. 26-47.
- 1936. Evidenz der palaearktischen Coccinelliden. Ent. Anz. 16 (20): 359.
- Matsumura, S. 1931. 6000 illustrated insects of Japan-Empire. Tokyo. p. 153.

- Michener, C. D. 1944. A comparative study of the appendages of the eighth and ninth abdominal segments of insects. *Ent. Soc. Amer., Ann.* 37 (3): 336-55, 3 pls.
- Miwa, Y. 1931. A systematic catalogue of Formosan Coleoptera. *Ent. Lab. Taihoku Imperial Univ., Contribution* 32: 91-2.
- 1943. A list of insect pests of Formosa. *Farmer association of Formosa, Publication* 16: 13, 207.
- Miwa, Y. and T. Yoshida. 1935. Catalogue of Japanese insects. Fasc. IX Coleoptera. *Ent. World.* 3 (22): 32-5.
- Motschulsky, V. de 1857. *Insectes du Japon. Etudes Ent.* 1857, p. 40.
- Mulsant, E. 1850. *Species des coléoptères trimères sécuripalpes.* Maison Libraire, Rue Christine, 3, Paris. 1104 pp.
- Redtenbacher, L. 1844. Tentamen dispositionis generum et specierum Coleopterorum pseudotrimerorum Archiducatus Austriae. *Zeitsch. Ent.* 5: 113-32.
- Sicard, A. 1910. Coccinellides de l'Inde. *Soc. Ent. France, Ann.* 79: 377.
- 1912. Descriptions d'espèces et variétés nouvelles de coccinellides de la collection du Deutsches Entomologisches Museum de Berlin, Dahlem. *Archiv Naturg.* 78 A (6): 133, 134.
- Snodgrass, R. E. 1957. A revised interpretation of the external reproductive organs of male insects. *Smithsonian Misc. Collect.* 135 (6): 1-11, 28-31.
- Sweetman, H. L. 1930. The external morphology of the Mexican bean beetle, *Epilachna corrupta* Muls. (Coccinellidae, Coleoptera). *New York Ent. Soc., Jour.* 38 (4): 423-54, 37 figs.
- Tanner, V. M. 1925. A preliminary study of the genitalia of female Coleoptera. *Amer. Ent. Soc., Trans.* 53: 29-30, figs. 117-124.
- Tao, H. C. 1927. The Coccinellidae of Soochow. *Lingnaam Agric. Rev.* 4 (2): 518, fig. 59.
- Thunberg, C. P. 1781. *Dissertatio entomologica novae insectorum species, sistens...Upsaliae,* apud J. Edman. Pt. 1, p. 18, t. 1, fig. 26.
- 1820. Coleoptera Capensia, antennarum clava, solida et perfoliata collecta, recensita et descripta. *Acad. St. Petersburg, Mem.* 7: 366.
- Uchida, S. et al. 1932. *Iconographia insectorum japonicorum.* Hokuryukan, Tokyo, p. 699.
- Verhoeff, C. 1895. Beiträge zur vergleichenden Morphologie des Abdomens der Coccinelliden. *Archiv Naturg.* 61: 1-80, 74 figs.
- Weise, J. 1892. Coccinellidae d'Europe et du nord de l'Asie. *L'Abeille* 28: 6-7.
- 1898a. Coccinelliden aus Kamerun. *Deutsche Ent. Zeitschr.* 1898: 97-125.
- 1898b. Über bekannte und neue Coccinelliden. *Archiv Naturg.* 64 (1): 236-7.
- 1902. Coccinelliden aus der Sammlung des Ungarischen National-Museums. *Termés. Füzet.* 25: 489-520.
- 1908. Coleopteren aus Ostindien. *Stett. Ent. Ztg.* 69: 217-8.
- 1912. Über Hispinen und Coccinelliden. *Archiv Naturg.* 78 A (12): 112.
- 1923. H. Sauter's Formosa-Ausbeute (Coccinellidae). *op. cit.* 89 A (2): 182-8.
- Wood, S. L. 1952. Observations on the homologies of the copulatory apparatus in male Coleoptera. *Ent. Soc. Amer., Ann.* 45 (4): 613-7, 14 figs.
- Wu, C. F. 1937. *Catalogus insectorum sinensium.* Fan Memorial Institute of Biology, Peiping. 3: 553-6.