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## Redescription of *Cassida insulana* GRESSITT, 1952 and notes on some other *Cassida* species from Taiwan (Coleoptera: Chrysomelidae: Cassidinae)

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ABSTRACT. *Cassida insulana* GRESSITT, 1952 is redescribed. *Cassida concha* SOLSKY, 1802 and *C. quadriramosa* GRESSITT, 1952 are recorded from Taiwan for the first time. Nomenclature of *Cassida crucifera* (KRAATZ, 1879) and variability of *C. sauteri* (SPAETH, 1913) are discussed. New host records are given for *Cassida concha*, *C. quadriramosa* and *C. sauteri*.

Key words: entomology, taxonomy, bionomy, Coleoptera, Chrysomelidae, Cassidinae, *Cassida*, Taiwan.

Taiwanese species of the genus *Cassida* L. were reviewed recently by KIMOTO and TAKIZAWA (1997). They listed 10 species from the island belonging to three subgenera but overlooked *Cassida insulana* GRESSITT, 1952 described from Taiwan with the type locality “southwestern Taiwan, Kaoshiang (Takao) District, Kizan County, southeast of Rokki (Rokkiri, Lakuli), Chirifu”. CHEN et al. (1986) basing on original description placed *Cassida insulana* in the subgenus *Taiwania*. In key to Chinese members of the subgenus *Taiwania*, CHEN et al. (1986) suggested similarity between *Cassida insulana* and *Cassida perplexa* (CHEN et ZIA, 1961). No recent material of *Cassida insulana* exists in collections.

We had an opportunity to study holotype of *Cassida insulana* GRESSITT, 1952 preserved in California Academy of Sciences and in our opinion it is a very distinct species, not closely related to *Cassida perplexa* or any Taiwanese species of the genus *Cassida*. Its redescription is given below. In the material of the genus recently collected

in Taiwan we found two species new to the island and some new hosts were observed. We also discuss nomenclature of *Cassida crucifera* (KRAATZ, 1879) and variability of *C. sauteri* (SPAETH, 1913).

We do not place discussed Taiwanese *Cassida* species in any exist subgenera. According to BOROWIEC (2007) the status of proposed subgeneric names is not balanced. Some subgenera are only narrow groups of very closely related species, others are broad artificial groups of unrelated taxa.

Colour photos were prepared using Helicon Focus software. Photos were digitally processed for better appearance. Measurements were taken with an ocular micrometer. Length ratio of antennal segments was measured as a percent of length of each segment to the length of the first segment.

### *Cassida insulana* GRESSITT, 1952

*Cassida* (Taiwania) *insulana* GRESSITT, 1952: 495.

*Taiwania* (s. str.) *insulana*: CHEN and al., 1986: 523; 631.

*Cassida insulana*: BOROWIEC, 1999: 259.

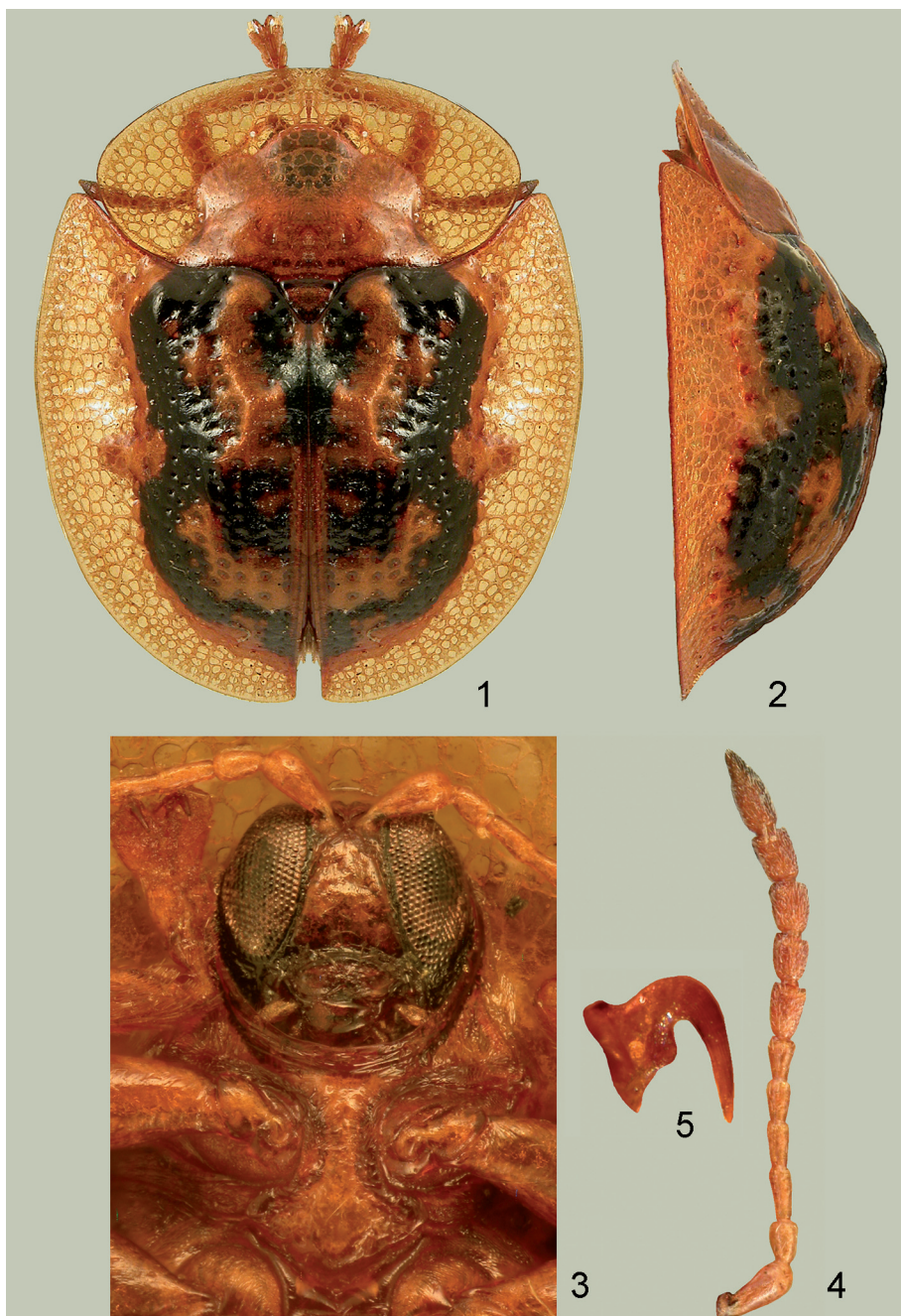
#### REDESCRIPTION

Length: 5.7 mm, width: 4.8 mm, length of pronotum: 2.05 mm, width of pronotum: 3.7 mm, length/width ratio: 1.19, width/length ratio of pronotum: 1.80. Body almost circular (Fig. 1).

Pronotum yellow. Scutellum yellow. Elytra with black and yellow pattern. Yellow spots on top of disc convex, form a relief. Yellow are: suture in short distance behind scutellum and on whole length behind black top of disc, S-shaped elevations surrounding postscutellar impressions, spot on each side of the S-shaped elevation, small spots in half length of first interval coalescent with yellow suture, large semi-lunar spot on slope, small spot on each humeral callus, marginal interval from base to lateral callus, and apex of disc (Figs. 1, 2). Explanate margin of elytra uniformly yellow. Ventrites, legs and antennae yellow, only apex of last antennal segment infusate.

Pronotum elliptical, with maximum width in the middle, sides broadly rounded, no basal corners. Disc moderately convex, indistinctly bordered from explanate margin except small impressions on sides of disc, with indistinctly separated area above head. Surface of disc smooth and shiny, with only few very small punctures at base. Explanate margin very broad, smooth and shiny, with honeycomb structure.

Scutellum triangular. Base of elytra distinctly wider than pronotum, elytral sides and apex rounded. Humeri strongly protruding anterad, angulate. Anterior margin of elytron smooth. Disc in profile convex, with top of convexity in 1/3 length of elytra (fig. 2), in postscutellar area with deep impressions thus top of disc form a low tubercle. Punctuation of disc mostly regular, coarse and dense, punctures in rows on black parts of disc with distance between punctures smaller than puncture diameter, on yellow sculpture slightly less dense, on semi-lunar spot punctures with distance approximately as wide as puncture diameter. Intervals well marked only in sutural half of disc then as wide as rows, on sides very narrow, linear, partly disturbed by rows. Marginal row



1-5. *Cassida insulana* GRESSITT: 1 – dorsal, 2 – lateral, 3 – clypeus and prosternal process, 4 – antenna, 5 – claw

distinct on whole length with punctures distinctly coarser than on sides of disc. Marginal interval well marked. Spaces between punctures and surface of intervals smooth and shiny. Explanate margin of elytra moderately declivous, broad, in the widest part as wide as half width of disc of each elytron, its surface appears slightly irregular but shiny. Honeycomb structure distinct. Apex of elytral epipleura with only few very short suberect setae.

Head moderately broad, eyes very large, gena obsolete. Clypeus approximately as long as wide, with fine clypeal lines converging in triangle. Clypeal plate smooth and shiny, without special sculpture. Labrum emarginate to 1/3 length. Prosternal process moderately broad, strongly expanded apically, without special sculpture (Fig. 3).

Antennae slim, segments 9 and 10 approximately 1.3 times as long as wide. Length ratio of antennal segments: 100:57:74:57:54:51:68:60:62:62:120, segment 3 approximately 1.3 times longer than segments 2 and 4 (fig. 4).

Claws with moderately large basal tooth (Fig. 5).

#### DISCUSSION

*Cassida insulana* is a very distinct species with no close relatives in Taiwan and only few similar species in the Oriental region. At first glance, similar coloration and sculpture are found in *Cassida gentilis* SPAETH, 1926 from Laos, Thailand and Vietnam, especially shape of yellow elevated spots are similar in both species. *C. gentilis* differs in maculate disc of pronotum with at least small V-shaped spot in front of base of scutellum and pronotal sides narrowly rounded to subangulate. Very broad pronotal sides and distinct basal tooth of tarsal claws place *C. insulana* close to *C. sauteri* SPAETH and its relatives (= subgenus *Taiwania* sensu SPAETH, 1913). Species of *C. sauteri* group differ in larger size with elytral length usually above 6 mm and base of elytra much distinctly wider from pronotum than in *C. insulana*. No species of *Cassida sauteri* group has elytral yellow spots as elevated as in *C. insulana*.

#### MATERIAL EXAMINED

Holotype: "Chirifu, Formosa, V-19-34" / "L. Gressitt Collector" / "Holotype *Cassida* (Taiwania) *insulana* J.L. Gressitt" / "California Academy of Sciences Type No. 5460" / "6."

### *Cassida concha* SOLSKY, 1802

*Cassida concha* SOLSKY, 1872: 264.

*Cassida* (*Mionycha*) *concha*: SPAETH, 1914 a: 129.

MATERIAL: Ilan, Taipingshan, 02 VI 2007, 1 ex., leg. H.-H. Li, 2007, 1 ex., leg. M.-H. Tsao.

This rare species has been known from Russian Far East, NE China (Heilongjiang, Jiangsu, Korea, and Japan (Honshu). New to Taiwan. KIMOTO and TAKIZAWA (1994) as host plant recorded *Lychnis miqueliana* ROHRB. (Caryophyllaceae). On Taiwan the species feeds on *Silene baccifera* (L.) ROTH (Caryophyllaceae).

*Cassida concha* belongs to the group of species close to European *Cassida azurea* FABRICIUS, 1801. The group has usually been classified as subgenus *Mionycha* WEISE, 1891. All species are associated with Caryophyllaceae plants. *Cassida concha* differs distinctly from all Taiwanese species of the genus in almost hemispherical body, uniformly yellow dorsum, regularly punctate elytra, elytral disc without tubercles, simple claws and last segment of tarsi not extending behind margin of third bilobate segment (Fig. 9).

### ***Cassida quadriramosa* GRESSITT, 1952**

*Cassida* (Taiwania) *quadriramosa* GRESSITT, 1952: 499.

*Taiwania* (s. str.) *quadriramosa*: CHEN and al., 1986: 532, 629.

*Taiwania quadriramosa*: PENG and LIU, 1992: 614.

*Cassida quadriramosa*: BOROWIEC, 1999: 276.

MATERIAL: Ilan, Taipingshan, 3 VI 2007, 1 ex. leg. M.-H. Tsao, 19 VIII 2007, 2 ex., leg. H.-H. Li; 22 IV 2007, 1 ex., leg. H.-H. Li.

This species has been known only from continental China (Fujian, Hubei, Hunan, Jiangxi, Sichuan). New to Taiwan. Host plant was hitherto unknown. Taiwanese specimens were collected on *Teucrium viscidum* BL. (Lamiaceae) and *Paraphlomis formosana* (HAYATA) T. H. HSIEH and T. C. HUANG (Lamiaceae).

*Cassida quadriramosa* is very close to *Cassida rati* MAULIK, 1923 a species wide spread in Oriental region, recorded from NE India, Myanmar, C and S China, northern Vietnam and Sumatra. It was also recorded from Taiwan: Arisan by SPAETH (1938) and Fenchihu, Chiayi Hsien by KIMOTO (1978). Both species are well distinguished by tuberculate elytra and explanate margin with both humeral and posterolateral spots. *C. quadriramosa* differs in base of elytra narrower in relation to the width of pronotum, lower postscutellar tubercle, elytra less converging posterad, coarser elytral puncturation and explanate margin of elytra without apical sutural spot (Fig. 8).

### ***Cassida sauteri* (SPAETH, 1913)**

*Taiwania Sauteri* SPAETH, 1913: 48.

*Cassida sauteri*: SPAETH, 1938: 236.

*Cassida* (Taiwania) *sauteri*: GRESSITT, 1952: 500.

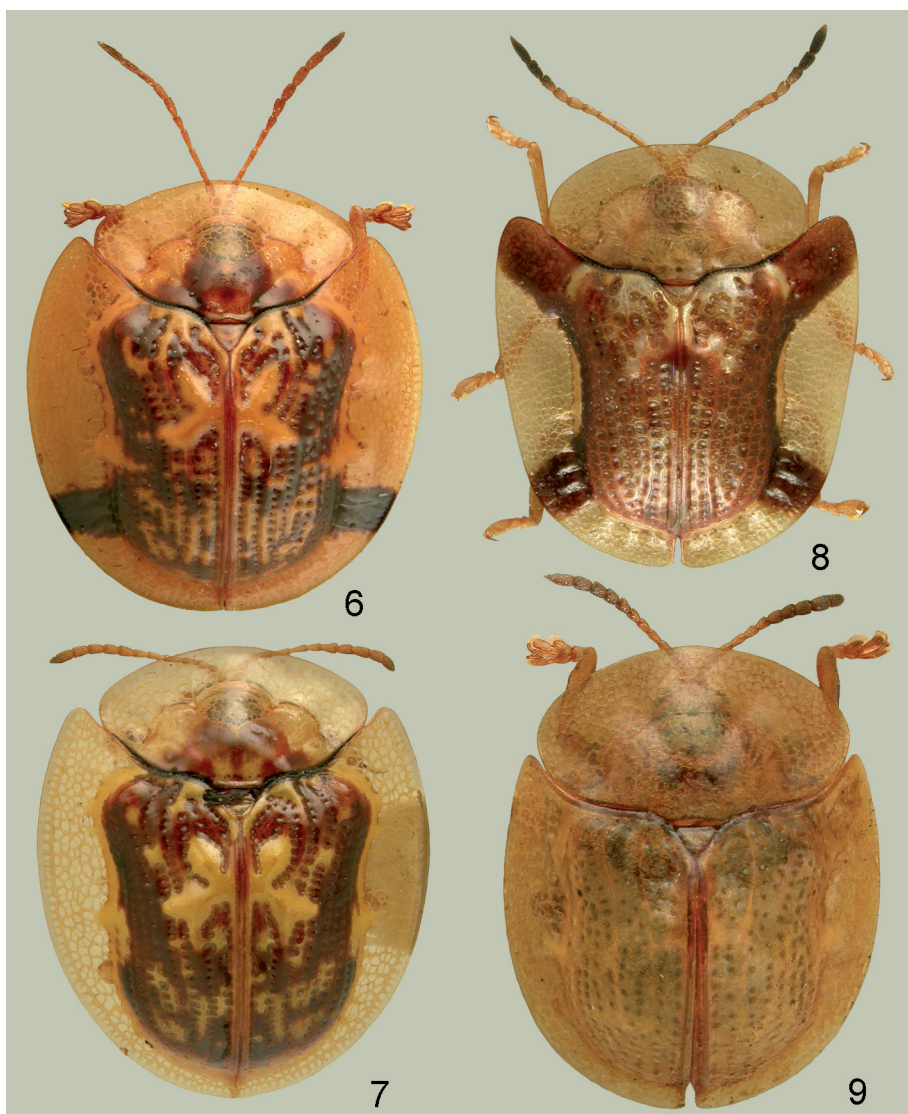
*Taiwania* (s. str.) *sauteri*: CHEN and ZIA, 1961: 440.

MATERIAL: Tainorin, VI 1909, 1 ex., leg. H. Sauter; Hoozan, VIII 1910, 2 syntypes, leg. H. Sauter; Chiayi Hsien, near Fenchihu, 8-9 VIII 1976, 4 ex., leg. W. Suzuki; Pingtung, Dahanshan, 22 II 2007, 1 ex., M.-H. Tsao, 24 VI 2007, 24 ex., leg. C.-F. Lee, 18 VII 2007, 1 ex., leg. S.-F. Yu.

Taiwanese specimens were collected on *Achyranthes longifolia* (MAKINO) MAKINO and *Achyranthes aspera* L. (Amaranthaceae). TAKIZAWA (1978) recorded another host from Taiwan - *Achyranthes japonica* (MIQ.) NAKAI (Amaranthaceae). Records from Rosaceae by GRESSITT and KIMOTO (1963) needs confirmation.



Our specimens demonstrate that the species is very variable in Taiwan in elytral pattern. Specimens from a long type series collected in Kosempo, Mt. Hoozan have mostly distinct black elytral pattern (Figs. 12, 13) which dominate over yellow background. Our recent specimens from Pingtung, Tahanshang have the pattern paler coloured, mostly reddish to brown, and scarcely distributed, thus yellow predominates on dorsum (Figs. 10, 11).



6-9. Dorsum: 6, 7 – *Cassida crucifera* KRAATZ, 8 – *C. quadriramosa* GRESSITT, 9 – *Cassida concha* SOLSKY

***Cassida crucifera* (KRAATZ, 1879)**

*Coptocycla crucifera* KRAATZ, 1879: 271.

*Coptocycla thais* ab. *crucifera*: SPAETH, 1914 a: 130.

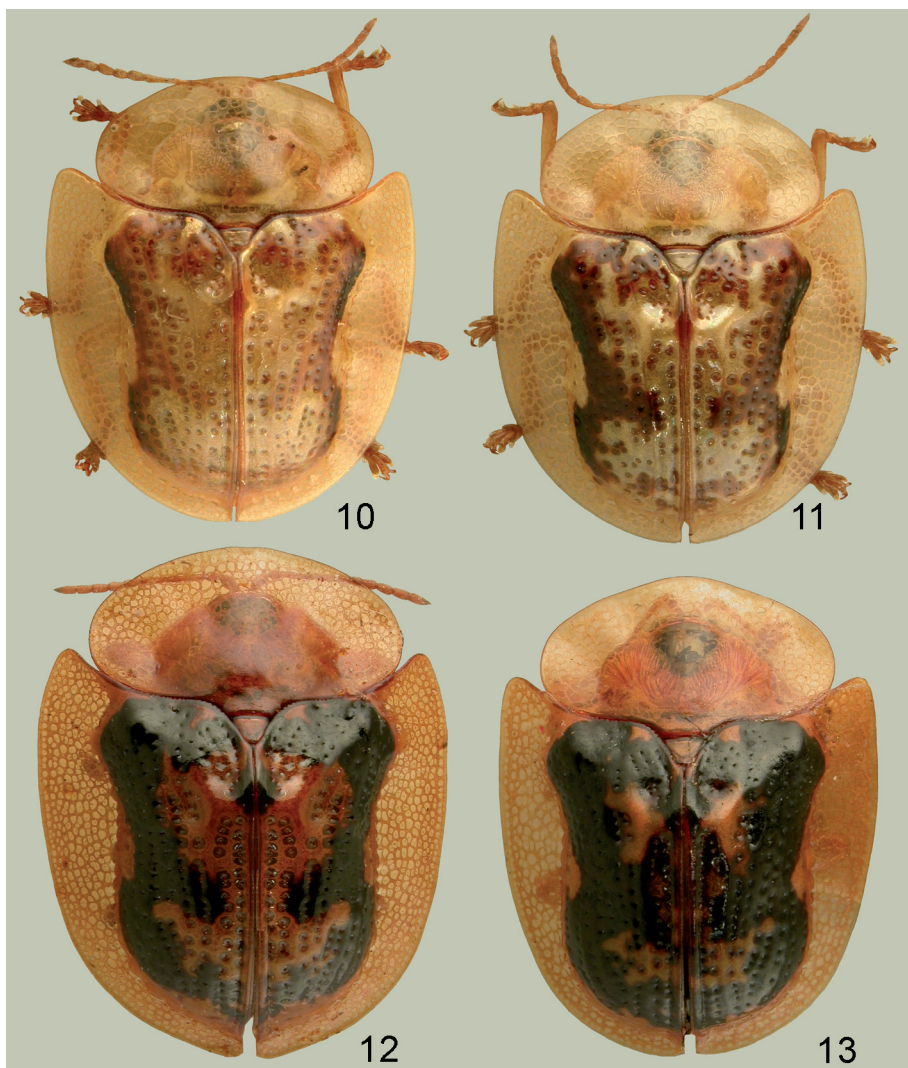
*Cassida versicolor* ab. *crucifera*: SPAETH, 1938: 235.

*Cassida versicolor crucifera*: MEDVEDEV and EROSHKINA, 1982: 105, 108.

*Metriona Thais* var. *crucifera*: SPAETH, 1914 b: 144.

*Metriona thais* ab. *crucifera*: SPAETH and REITTER, 1926: 65.

*Metriona* (*Metriona*) *thais* ab. *crucifera*: CHŪJŌ, 1934: 160.



10-13. Variation of colour pattern of *Cassida sauteri* SPAETH

*Metriona thais crucifera*: GRESSITT, 1938: 191.

*Cassida (Taiwania) crucifera*: MEDVEDEV and EROSHKINA, 1988: 117, 130, 135.

*Cassida crucifera*: BOROWIEC, 1999: 245.

MATERIAL: Pingtung, Dahanshan, 18 VII 2007, 2 ex., leg. C.-F. Lee, 4 ex., leg. S.-F. Yu; Taipei, Yangmingshan N. P., 19 IV 2007, 4 ex., leg. C.-F. Lee; Taipei, Gueitzukeng, 6 X 2007, 4 ex., leg. C.-F. Lee; Taipei, Wulai, 27 III 2007, 1 ex., leg. S.-F. Yu; Taoyuan, Shichoushan, 3 II 2007, 1 ex., leg. S.-F. Yu, 17 III 2007, 3 ex., leg. M.-H. Tsao.

The nomenclature of this species has been confusing. KRAATZ (1879) described *Cassida crucifera* from a single specimen from Japan similar to *Cassida versicolor* (BOHEMAN, 1855). Taiwanese specimens without spots on explanate margin of elytra are without doubts conspecific with *C. crucifera*. WEISE (1900) synonymised *C. crucifera* with *Cassida thais* (BOHEMAN, 1862). Further authors (see synonymical list above) treated this taxon as aberration or synonym of *C. versicolor* or *C. thais*. Surprisingly, MEDVEDEV and EROSHKINA (1988) after study of material from Vietnam suggested that *C. variabilis* with posterolateral spot on explanate margin and *C. crucifera* without spots are distinct species well distinguished by structure of male genitalia. Russian authors overlooked that BOHEMAN described form without spot as *C. versicolor* and spotted form as *C. thais*. KIMOTO and TAKIZAWA (1997) used name *C. versicolor* for Taiwanese population. BOROWIEC (1999) after MEDVEDEV and EROSHKINA (1988) cited form with posterolateral spots on explanate margin of elytra (Fig. 6) under name *C. versicolor* (with *C. thais* as its synonym) and form without spots under name *C. crucifera* (Fig. 7). After study of large material of this group of species from China, Japan, Taiwan and Vietnam we concluded that the group in reality comprises two species: the first smaller, forms both aberrations with and without spots on explanate margin, and the second, slightly larger, which is known only from spotted specimens. This smaller species is distributed in Japan, China, Taiwan and northern Vietnam, the larger one is restricted only to southern China and northern Vietnam. Without doubts the names *C. crucifera* (unspotted form) and *C. thais* (spotted form) are synonyms because both taxa were described from regions where only smaller species is recently known. *C. versicolor* was described generally from China and without study of type it is difficult to say if the name is senior synonym of both *C. crucifera* and *C. thais*. If yes, then the larger species leaves unnamed. Before revision of types of all three names we have recorded Taiwanese population under name *C. crucifera* because unspotted form predominates in our material.

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