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A PRELIMINARY REVISION OF THE GENUS
SPINARIA BRULLÉ (*HYMEN., BRACONIDAE*)

By

CHIHISA WATANABE

(With one Textfigure)

The following paper is a preliminary revision of the aberrant and interesting genus of *Braconidae*.

On this occasion the writer wishes to acknowledge his indebtedness to Professor Emeritus S. MATSUMURA and Assistant Professor T. UCHIDA for their kind advices. Sincere thanks are also due to Dr. T. ISHII, Mr. K. KUWASHIMA, Mr. J. SONAN, and Mr. K. TAKEUCHI for their kindness in sending certain materials.

Genus *Spinaria* BRULLÉ

Spinaria BRULLÉ, Hist. Nat. Ins. Hymén., IV, p. 512 (1846); WESTWOOD, Ent. Tidskr., XXV, p. 26 (1882); DALLA TORRE, Cat. Hymen., IV, p. 255 (1898); SZÉPLIGETI, Term. Füzet., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904); ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 229 (1905); ROMAN, Ark. Zool., 8 A, No. 15, p. 43 (1913).

Brownius ASHMEAD, Canad. Entomologist, XXXVII, p. 7 (1905).

Genotype—*Spinaria armator* (FABRICIUS).

At the present time this genus is represented by the species having a spine on the prothorax as defined by ENDERLEIN, the general structure being as follows:—

♀. Head transverse above; eyes kidney-shaped in moderate size, emarginated inwardly opposite the insertion of the antennae, the distance between the eyes and the anterior ocellus longer than the diameter of the latter; occiput immarginated; antennae longer than the body. Prothorax bidentate anteriorly and armed above with a long, acute, curved spine posteriorly on its disk; parapsidal furrows deep and smooth; mesopleurae possessing a smooth discal furrow; propodeum striate-rugose, at each lateral apex projecting into a stout tooth. Radius originating from the middle of the stigma; 1st abscissa of the radius half the length of the 2nd; 1st intercubitus oblique, as long as the 2nd abscissa of the radius, and the 2nd intercubitus vertical; recurrent nervure received in the 1st cubital cell a short distance from the apex; nervulus post-furcal. Abdomen five-segmented, closely longitudinally striate; sutures strongly

crenulate; 3rd and 4th tergites on each lateral hind angle projecting into a sharp stout spine, and each median keel of these tergites dilated into a blunt tooth; 5th tergite with a sharp median tooth at the apex; ovipositor short, not surpassing the end of the abdomen, the sheath stout, covered uniformly with black hairs.

Length, 10-14 mm.

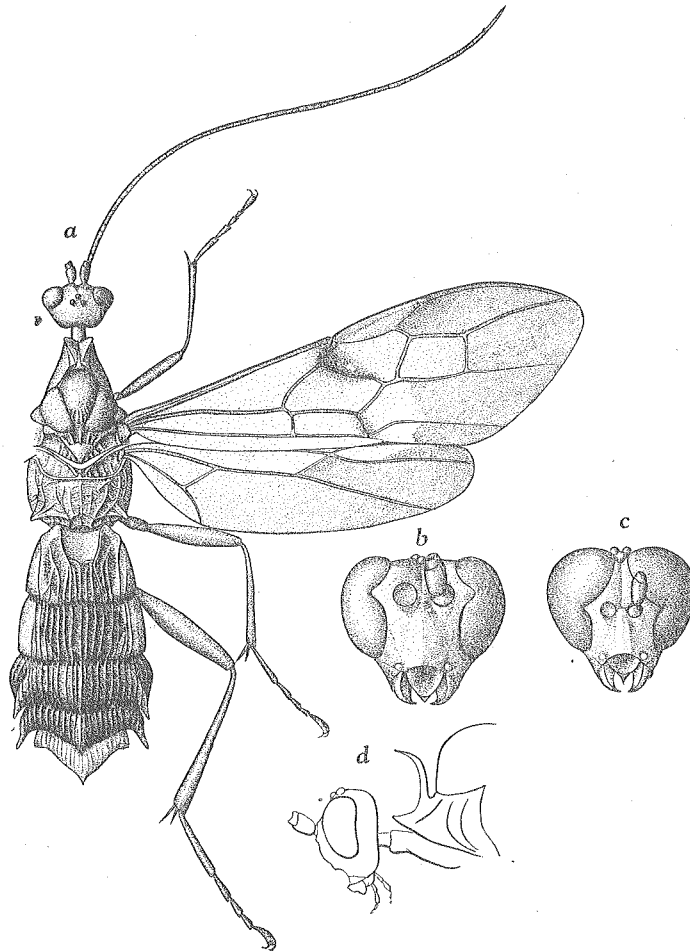


Fig. 1

Spinaria armator (FABRICIUS)

- a. Dorsal view (♀) b. Head (♀), frontal view
c. Head (♂), frontal view d. Head and prothorax (♀), lateral view

♂. Differs from the female, apart from usual sexual differences, in the following points:—

(1) Eyes much larger than in the female, the distance between the eyes and the anterior ocellus shorter than the diameter of the latter.

(2) Spine of the prothorax nearly straight.

(3) Abdomen slenderer, the spines and teeth generally not so strongly developed as in the female.

Length, 9-12 mm.

Former authors have taken somewhat divergent views about the systematic position of this genus: DALLA TORRE (1898) placed it in the subfamily *Braconinae* (=Tribe *Braconini* HANDLIRSCH*), and ASHMEAD (1905) treated it as a member of his tribe *Eurobraconini* which has recently been combined with the tribe *Braconini*, while SZÉPLIGETI (1902, 1904) included it in the subfamily *Exothecinae* (=Tribe *Exothecini* HANDLIRSCH*). The present writer is, however, inclined to the opinion that this genus should be placed in the *Braconini*.

As many as twenty species have been described as belonging to *Spinaria* mostly in the Indo-Australian region, but some of them already have sunken to synonyms, or been transferred to other genera. Consequently there are thirteen species of this genus as arranged in four smaller groups. Furthermore, nothing is known regarding the host relationships of these species, except *Spinaria spinator* (GUÉRIN) which is a parasite of the larva of the Cochlidionid moth, *Setora nitens* WALKER.

In conclusion, it is not possible to give a complete revision of these interesting species in the present state of the writer's knowledge. Indeed, not all the types have yet been examined by the writer. Based on the colouration of the wings and abdomen, these species are arranged in four groups as in the following pages, but the writer is by no means satisfied as to be a natural classification. Since comparing the present specimens which belong to three different groups, he is unable to find any specific differences between them except their colouration. Further examinations of abundant materials of different localities and experiments regarding their habits are necessary before a complete revision can be satisfactorily given.

Group I.

The wings are fulvo-hyaline, with the apices broadly smoky; there is an oblique black cloud at the base of the stigma. The abdomen is pale yellow, with black markings on the dorsum. The following three species fall in this group.

* Handbuch der Entomologie, Bd. III, pp. 748-749 (1924).

1. *Spinaria armator* (FABRICIUS)

Bracon armator FABRICIUS, Syst. Piez., p. 107 (1804).

Ichneumon furcator THUNBERG, Mén. Acad. Sc. St. Pétersbourg, VIII, p. 261 (1822); id., l. c., IX, p. 310 (1824).

Spinaria armator BRULLÉ, Hist. Nat. Insect. Hymén., IV, p. 513 (1846); WESTWOOD., Ent. Tidskr., XXV, p. 26 (1882); DALLA TORRE, Cat. Hymen., IV, p. 255 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904); WATANABE, Ins. Mats., VIII, p. 187 (1934).

In a series of the present specimens from Formosa the colouration somewhat differs from the original description as follows:—

♀. Hind legs entirely reddish yellow; 1st tergite pale yellow with a black spot at the apex, the 2nd black with a broad pale yellow stripe on each side, the 3rd and 4th almost black, and the 5th uniformly pale yellow.

Length, 10-12 mm.

♂. Hind legs entirely reddish yellow; all tergites mostly black, only the 1st and 2nd tergites possessing a narrow pale yellow stripe on each side.

Length, 10 mm.

Habitat—Sumatra (after FABRICIUS); Java (after WESTWOOD); Formosa (Taihorin, Koshun, and Kosempo, after WATANABE; Koshun, 1 ♀, 23. IV, 1922, K. TAKEUCHI; Shinchiku, 1 ♀, 1.-30. VIII, 1918, J. SONAN; Sôzan, 1 ♂, 30. VIII, 1912, J. SONAN; Taihoku, 1 ♀, 14. V, 1922, K. TAKEUCHI; Tamaho, 1 ♀, 1. VII, 1925, T. UCHIDA, H. KÔNO, and Y. MIWA).

2. *Spinaria albiventris* CAMERON

Spinaria albiventris CAMERON, Mem. Proc. Manch. Philos. Soc., XLIII, p. 82, ♀ (1899); SZÉPLIGETI, Gen. Insect., 22-24, p. 47 (1904).

Judging from the original description, this species is closely related to *S. armator*, from which, however, it may be separated only on account of its black propodeum.

Habitat—India (Khasia Hills, after CAMERON).

3. *Spinaria bicolor* SZÉPLIGETI

Spinaria bicolor SZÉPLIGETI, Term. Füz., XXV, p. 46, ♂ (1902); id., Gen. Insect., 22-24, p. 47 (1904).

According to SZÉPLIGETI, this species differs from *S. armator* only in the colour of the 1st tergite, which in the former is uniformly yellowish red.

Habitat—Borneo (after SZÉPLIGETI).

Group II.

The wings are very like those of Group I. The abdomen is pale yellow, and the dorsum possesses reddish yellow markings which in Group I. are black. The following four species belong to the present group.

4. *Spinaria spinator* (GUÉRIN)

Bracon spinator GUÉRIN, DUPERRY: Voy. Conquille. Zool., II, p. 199 (1830).

Spinaria spinator BRULLÉ, Hist. Nat. Insect. Hymén., IV, p. 514 (1846); WESTWOOD, Ent. Tidskr., XXV, p. 28 (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904); ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 231 (1905); WILKINSON, Bull. Ent. Res., XXI, p. 275 (1930); WATANABE, Ins. Mats., VIII, p. 187 (1934).

In a series of the present specimens from Formosa the colouration is somewhat variable in both sexes as below:—

♀. Basal three tergites laterally and the 5th entirely pale yellow; hind legs reddish yellow, darker than the four anterior ones; 5th joint of the hind tarsi black, sometimes the 3rd to 5th joints fuscous.

Length, 9-10 mm.

♂. Basal two tergites pale yellow laterally, and the 5th entirely black; wings more broadly fuscous than in the female; tibiae and tarsi of the hind legs fuscous, or only the 5th joint of the tarsi black.

Length, 9 mm.

Host—*Setora nitens* WALKER

According to WILKINSON, this species is parasitic on the larva of the Cochlidionid Moth, *Setora nitens* WALKER, in Malaya.

Habitat—India (Bengal, after GUÉRIN); Sula Island (after ENDERLEIN); Sumatra (Soekaranda, after ENDERLEIN); Malaya (Teluk Auson, Serdang, and Kuala Lumpur, after WILKINSON); Formosa (Koshun, Kosempo, and Taihorin, after WATANABE; Horisha, 1 ♀, 5. V, 1922, K. TAKEUCHI; Kusukusu, 2 ♀ ♀, 20.-21. IV, 1928, S. MATSUMURA; Taiheizan, 1 ♀, 6. IX, 1923, J. SONAN).

5. *Spinaria suliana* WESTWOOD

Spinaria suliana WESTWOOD, Ent. Tidskr., XXV, p. 32 (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904).

Reading the original description, the writer can not find any specific differences between *S. spinator* and the present species except the colour of the hind legs which are uniformly reddish yellow in the latter.

Habitat—Sula Island (after WESTWOOD).

6. *Spinaria flavipennis* CAMERON

Spinaria flavipennis CAMERON, Entomologist, XXXIX, p. 205, ♀ (1906).

This species appears to be a synonym of *S. spinator*.

Habitat—India (Sikkim, after CAMERON).

7. *Spinaria bhotanensis* CAMERON

Spinaria bhotanensis CAMERON, Entomologist, XXXIX, p. 206, ♀ (1906).

According to CAMERON, this species is differentiated from *S. flavipennis* by

the clouding of the wings and the structure of the mesopleurae, but the writer is inclined to the opinion that it should be combined with *S. spinator*.

Habitat—India (Buxa, Bhotan, after CAMERON).

Group III.

The wings are uniformly dark fuscous, sometimes with their extreme bases flavo-hyaline. The abdomen is pale yellow, with black markings as in Group I. The following four species are represented in this group.

8. *Spinaria fuscipennis* BRULLÉ

Spinaria fuscipennis BRULLÉ, Hist. Nat. Insect. Hymén., IV, p. 514, ♀ (1846); WESTWOOD, Ent. Tidskr., XXV, p. 29, ♀ (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füzet., XXV, p. 45 & 46, ♀ ♂ (1902); id., Gen. Insect., 22-24, p. 47 (1904).

♀. Wings uniformly dark fuscous; hind legs black; 1st to 4th tergites black, the 1st and 2nd laterally and the 5th entirely pale yellow (after BRULLÉ and SZÉPLIGETI).

♂. Differs from the female in that the 5th tergite is black (after SZÉPLIGETI).

Habitat—China (after BRULLÉ); Java (after BRULLÉ); Borneo (after SZÉPLIGETI).

8a. var. *armata* (ASHMEAD)

Brownius armatus ASHMEAD, Canad. Entomologist, XXXVII, p. 7, ♂ (non ♀) (1905).

Spinaria philippinensis ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 230, ♀ (1905).

Spinaria luzonensis ENDERLEIN, l. c., LXVI, p. 231, ♀ (1905).

Spinaria fuscipennis BRULLÉ var. *armata* ROMAN, Ark. Zool., 8 A, No. 15, p. 43, ♀ ♂ (1913).

ROMAN (1913) treated three species—*Brownius armatus* ASHMEAD, *Spinaria philippinensis* ENDERLEIN, and *Spinaria luzonensis* ENDERLEIN—from the Philippine Islands as a variety of *S. fuscipennis*: this variety is distinguished from the typical form only in having dark fuscous wings with their extreme bases flavo-hyaline.

In a series of the present specimens (3 ♀ ♀) from the Philippine Islands the colour of the hind legs and abdomen is somewhat variable as ROMAN pointed out: in one specimen (1 ♀, Mt. Maquiling) the hind legs are black, the coxae have a yellow spot at each base, the 1st tergite is pale yellow with a large black spot near the base, and the 5th is entirely pale yellow, while in the others (1 ♀, Maloong and 1 ♀, Zamboanga) the hind legs are black, the coxae and trochanters are reddish yellow, the 1st tergite is pale yellow with a brown rectangular spot near the base, and the 5th is uniformly black.

Habitat—Philippine Islands (Manila, Luzon, after ASHMEAD; Basilan and Luzon, after ENDERLEIN; Mt. Maquiling, Luzon, 1 ♀, X, 1929, T. ISHII; Zambo-

anga, Mindanao, 1 ♀, 12. VI, 1933, K. KUWASHIMA; Maloong, Basilan, 1 ♀, 15. V, 1933, K. KUWASHIMA).

Remarks—DALLA TORRE (1898) and SZÉPLIGETI (1904) gave Japan as a locality of this species, but they may have mistaken Java for Japan.

9. *Spinaria dimidiata* WESTWOOD

Spinaria dimidiata WESTWOOD, Ent. Tidskr., XXV, p. 31, ♀, pl. 7, Fig. 3-4 (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904).

Judging from the original description, this species closely resembles *S. fuscipennis* var. *armata* in general colouration, but the 1st tergite is entirely pale yellow, the 2nd and following tergites are black, and the hind legs are reddish yellow.

Habitat—Ceram (after WESTWOOD).

10. *Spinaria curvispina* CAMERON

Spinaria curvispina CAMERON, Journ. Straits Branch Royal As. Soc., No. 37, p. 34, ♀ (1902); ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 232, ♀ (1905).

Judging from the original description, this species may be identical with *S. fuscipennis*.

Habitat—Borneo (Sarawak, after CAMERON); Sumatra (Soekaranda, after ENDERLEIN).

The following two varieties may be combined with *S. fuscipennis*:

10a. var. *nigricauda* ENDERLEIN

Spinaria curvispina CAMERON var. *nigricauda* ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 232, ♀ ♂ (1905).

Habitat—Sumatra (Fort de Koch, after ENDERLEIN); Borneo (after ENDERLEIN).

10b. var. *udei* ENDERLEIN

Spinaria curvispina CAMERON var. *Udei* ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 232, ♀ (1905).

Habitat—Sumatra (Soekaranda, after ENDERLEIN).

11. *Spinaria aliciae* TURNER

Spinaria aliciae TURNER, Ann. Mag. Nat. Hist., XX, p. 244, ♂ (non ♀) (1917).

TURNER separated this species from the related ones on account of the following characters:—"Easily distinguished from *curvispina* CAM., *luzonensis* ENDERLEIN, and other Malayan species with somewhat similar colouring by the very large eyes and by the shorter and straight spine of the pronotum, also by the shorter second cubital cell. The second tergite is twice as broad as

long." These may, the writer believes, merely be sexual characters and of less than a specific value.

Habitat—Australia (Kyrunda, North Queensland, after TURNER).

Group IV.

The wings are dark fuscous, with their extreme bases fulvo-hyaline. The abdomen is whitish yellow, with reddish yellow markings as in Group II. The following two species are included in this group.

12. *Spinaria sulcata* SMITH

Spinaria sulcata SMITH, Journ. Linn. Soc. Zool., VIII, p. 67, ♀, Pl. 4, Fig. 9 (1864); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füzet., XXV, p. 45 & 46, ♀ ♂ (1902); id., Gen. Insect., 22-24, p. 47 (1904); ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 232, ♀ (1905).

Spinaria sulcator WESTWOOD, Ent. Tidskr., XXV, p. 27 (1882).

According to SMITH (1864), this species is, "quite distinct from the species described by BRULLÉ (*Hist. nat. ins. Hymén.*) and that described by GUÉRIN in *voyage de la Conquille (Bracon spinator)*. Our species most closely resembles the latter, but differs in having the wings¹⁾ entirely dark, in the abdomen deeply striated, and in not having a spine in the middle of the third and fourth segments of the abdomen."

Habitat—Moluccas (Gilolo, after SMITH; Batyan, after SZÉPLIGETI and ENDERLEIN).

13. *Spinaria westwoodi* CAMERON

Spinaria westwoodi CAMERON, Journ. Straits Branch Royal As. Soc., No. 46, p. 109, ♀ (1906).

This species is placed in this group on the basis of the original description, in which it is differentiated from *S. curvispina* and *S. dimidiata* by the colouration of the abdomen.

Habitat—Borneo (Kuching, after CAMERON).

13a. var. *flavipennis* ROMAN

Spinaria Westwoodii CAMERON var. *flavipennis* ROMAN, Ark. Zool., 8 A, No. 15, p. 44, ♀ (1913) (non *S. flavipennis* CAMERON, 1906).

This variety may be transferred to Group II., separating it from the typical form, since its colouration rather agrees with that of *S. spinator* than that of the typical form.

Habitat—Philippine Islands (after ROMAN).

1) In the original description, "alis fuscis basi flavo-hyalinis."

A TABLE OF GEOGRAPHICAL DISTRIBUTION

Species	Habitats											
	India	Malaya	Sumatra	Java	Borneo	China	Formosa	Philippines	Moluccas	Sula Is.	Ceram	Australia
Group I.												
1. <i>Spinaria armator</i> (FABRICIUS)			+	+			+					
2. <i>S. albiventris</i> CAMERON	+											
3. <i>S. bicolor</i> SZÉPLIGETI					+							
Group II.												
4. <i>Spinaria spinator</i> (GUÉRIN)	+	+	+				+			+		
5. <i>S. suliana</i> WESTWOOD										+		
6. <i>S. flavipennis</i> CAMERON	+											
7. <i>S. bhotanensis</i> CAMERON	+											
Group III.												
8. <i>Spinaria fuscipennis</i> BRULLÉ				+	+	+						
8a. var. <i>armata</i> (ASHMEAD)								+				
9. <i>S. dimidiata</i> WESTWOOD											+	
10. <i>S. curvispina</i> CAMERON			+		+							
10a. var. <i>nigricauda</i> ENDERLEIN			+		+							
10b. var. <i>udei</i> ENDERLEIN			+									
11. <i>S. aliciae</i> TURNER												+
Group IV.												
12. <i>Spinaria sulcata</i> SMITH									+			
13. <i>S. westwoodi</i> CAMERON					+							
13a. var. <i>flavipennis</i> ROMAN								+				

Species unknown to the writer

The following species may probably not belong to *Spinaria*, but their true generic position is unknown to the writer.

Spinaria (?) *inermis* GUÉRIN

Spinaria inermis GUÉRIN, LÉFÉBURE: Voy. Abyssinie, VI, p. 350, Pl. 7, fig. 5 (1848); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Gen. Insect., 22-24, p. 47 (1904).

Spinaria (?) *inermis* BRUES, Proc. Amer. Acad. Art. Sci., LXI, p. 378 (1926); FAHRINGER, Opusc. bracon., Bd. III, p. 60 (1930).

Mesobracon (?) *inermis* FAHRINGER, Opusc. bracon., Bd. II, p. 142 (1928).

Habitat—Abyssinia (after GUÉRIN).

Spinaria (?) *trimaculata* CAMERON

Spinaria trimaculata CAMERON, Mem. Proc. Manch. Philos. Soc., XLIV, p. 81, ♀ (1900); SZÉPLIGETI, Gen. Insect., 22-24, p. 47 (1904).

The original description is too incomplete to determine the generic position of this species as ENDERLEIN (1905) pointed out:—"Ob *Spinaria trimaculata* CAM. aus Indien in dieser Gattung zu verbleiben hat order in die Gattung *Batotheca* gehört, ist nicht festzustellen, da trotz der langen Diagnose die hierzu wesentlichen Charaktere nicht angegeben sind."

Habitat—India (after CAMERON).

Species referable to other genera

The following species were originally described as belonging to *Spinaria*, but they are most probably referable to other genera.

Batotheca leucomelaena (WESTWOOD)

Spinaria leucomelaena WESTWOOD, Ent. Tidskr., XXV, p. 31, Pl. 7, fig. 2 (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id., Gen. Insect., 22-24, p. 47 (1904).

Batotheca leucomelaena ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 278 (1905); CAMERON, Entomologist, XXXIX, p. 205 (1906).

Habitat—French Indo-China (Cambodia, after WESTWOOD); India (Sikkim, after CAMERON).

Batotheca nigriceps (CAMERON)

Spinaria nigriceps CAMERON, Mem. Proc. Manch. Philos. Soc., XLI, p. 37, Pl. 3, Fig. 7 (1897); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Gen. Insect., 22-24, p. 47 (1904).

Batotheca nigriceps ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 278 (1905).

Habitat—Ceylon (after CAMERON).

***Batotheca beccarii* (MANTERO)**

Spinaria Beccarii MANTERO, Ann. Mus. Civ. St. Nat. Genova, Serie 23, XX, p. 543, ♀, with Fig. ♀ (1900); SZÉPLIGETI, Gen. Insect., 22-24, p. 47 (1904).

Batotheca Beccarii ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 229 (1905).

Habitat—Celebes (after MANTERO); Sumatra (Soekaranda, after ENDERLEIN); Moluccas (Batyan, after ENDERLEIN).

***Pseudospinaria attenuata* (WESTWOOD)**

Spinaria attenuata WESTWOOD, Ent. Tidskr., XXV, p. 39, ♀, Pl. 7, Fig. 1 (1882); DALLA TORRE, Cat. Hymen., IV, p. 256 (1898); SZÉPLIGETI, Term. Füz., XXV, p. 45 (1902); id. Gen. Insect., 22-24, p. 47 (1904).

Pseudospinaria attenuata ENDERLEIN, Stett. Ent. Zeit., LXVI, p. 229 (1905).

Habitat—Borneo (after WESTWOOD).

subsp. ***flavostigma* (TURNER)**

Spinaria attenuata WESTWOOD subsp. *flavostigma* TURNER, Ann. Mag. Nat. Hist., V, p. 92, ♀ (1920).

Habitat—French Indo-China (Luang Prabang, after TURNER).

***Spinariella mutica* (SZÉPLIGETI)**

Spinaria mutica SZÉPLIGETI, Term. Füz., XXV, p. 46, ♂ (1902); id., Gen. Insect., 22-24, p. 47 (1904).

Spinariella mutica SZÉPLIGETI, Ann. Mus. Nat. Hist. Hung., IV, p. 595 (1906).

Habitat—Celebes (after SZÉPLIGETI).

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