A revision of the tribe Scymnini from Japan and the Loochoos (Coleoptera: Coccinellidae) : Part II. Genus Scymnus (Subgenus Pullus)

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A revision of the tribe Scymnini from Japan and the Loochoos (Coleoptera: Coccinellidae)[1]

Part II. Genus *Scymnus* (Subgenus *Pullus*)

Hiroyuki Kamiya[2]

Subgenus *Pullus* Mulsant, 1846

Sécuripalp.: 241.

Type: *Scymnus* (*Pullus*) *subvillosus* (Goeze, 1777)

Key to the species of the subgen. *Pullus* from Japan and the Loochoos

1(4) Elytra black with two pairs of red markings.

2(3) Pronotum black without a distinct red markings; body small in size. Elytra with two pairs of red spots, each spot oval in form and not reaching the elytral margin or suture. Body length: 1.7 mm. ..... *sapporensis*

3(2) Pronotum black with a pair of red markings; body large in size. The marking of pronotum large, reaching the lateral margin of pronotum and anterior margin of pronotum narrowly reddish in colour, this red marginal colour is connected with the lateral markings; elytra with two pairs of transverse red bands, the bands of each side not connected but devided by a black suture; the anterior band waved. Body length: 3.0–3.2 mm. ..... *fortunatus*

4(1) Elytra back with one pair of red markings or red apical markings or unicolour.

5(6) Body uniformly reddish in colour. Body length: 1.9 mm. .... *takaraensis*

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6(5) Body not uniformly reddish in colour.

7(14) Pronotum entirely reddish, elytra black with red apex. (Pronotum rarely with an indistinct black marking at the base, if so, elytron without distinct strongly punctured striae along the suture and direction of elytral hairs not arranged in a strong curve).

8(11) Body rather short, ratio of length to width less than 1.50. Anterior margin of clypeus incided. Lateral margins of the body outline distinctly arched. Apical red marking of elytron wide.

9(10) Apical red marking of elytron very wide, about one-third of elytron. Anterior border between elytral apical red marking and black ground colour indistinct and linear. Abdomen entirely red. Anterior margin of clypeus more strongly incised. Lateral lobes of tegmen of male genitalia slender, nearly as long as median piece. Median piece of tegmen wide with a distinct pointed process at the apex in ventral aspect. Body length: 1.8–2.1 mm., L/W: 1.29–1.49 ..... *contemptus*

10(9) Apical red marking of elytron rather narrow, less than one-fourth the elytral length. Anterior border of the elytral apical red marking distinct and arched anteriorly. Abdomen usually dark in colour at the basal segments. Anterior margin of clypeus weakly incised. Lateral lobes of tegmen distinctly longer than the median piece; median piece of tegmen pointed at the apex but without a distinct process. Body length: 1.5–1.8 mm., L/W: 1.32–1.45 ..... *rectus*

11(8) Body rather long, ratio of the length to the width more than 1.55. Anterior margin of clypeus flat or slightly incised. Lateral margins of the body outline nearly parallel to each other at the middle.

12(13) Lateral lobes of tegmen distinctly longer than the median piece; tegmen very slender. Scutellum regular triangle. Punctures on elytron finer than those of the next species. Elytron often with strongly punctured stria along the suture. Body length: 1.8–2.2 mm., L/W: 1.55–1.65 ..... *dorcatomoides*

13(12) Lateral lobes of tegmen distinctly shorter than the median piece; tegmen not slender. Scutellum slightly shorter than long. Punctures on elytron rather strong. Body length: 1.7–2.0 mm., L/W: 1.56–1.66 ..... *miyatakei*

14(7) Pronotum black or yellow with a black marking; if pronotum entirely red or yellow, elytron with a longitudinal marking.

15(27) Elytron with a longitudinal marking or a small red marking near the apex. If the above mentioned longitudinal marking indistinct, area surrounded by the femoral line of the first

abdominal sternum uniformly very densely punctured, or body very convex and femora very much swollen.

16(22) Area surrounded by the femoral line of the first abdominal sternum uniformly very densely punctured, the area near the femoral line not smooth.

18(19) Body very elongate, 1.7 times as long as wide. Pronotum entirely black; elytron blackish brown, with blackish margins except the apex. Lateral margins of pronotum parallel to each other at the base, not strongly converging apically. Body length: 2.5–3.0 mm. ..... *yamato*

19(18) Body not very elongate, lateral margins of pronotum at the base not parallel to each other but strongly converging apically.

20(21) Dorsal hairs long and rather sparse; direction of elytral hairs arranged in rather gently curved S-shape as shown in Pl. 39-K. Longitudinal reddish marking of elytron and basal black marking on pronotum with an indistinct border; pronotum sometimes entirely reddish. Punctuation of the enclosed area by the femoral line of the first abdominal sternum sparser than the next species. Lateral lobes of tegmen distinctly longer than median piece. Body length: 2.0–2.3 mm. ..... *fuscatus*

21(20) Dorsal hairs short and denser; direction of elytral hairs arranged in strongly curved S-shape as shown in Pl. 39–E. The border between the ground colour and a marking on pronotum and elytron rather distinct. Pronotum sometimes entirely black. Punctuation of the enclosed area by the femoral line of the first abdominal sternum denser than the former species. Lateral lobes of tegmen distinctly shorter than the median piece. Body length: 1.6–2.4 mm. ..... *hoffmanni*

22(16) Area surrounded by the femoral line of the first abdominal sternum not uniformly punctured but more or less smooth near the line.

23(24) Body very convex. Femora robust. Dorsal surface pichy black, anterior half of pronotum reddish brown, apical two-fifths of elytron reddish and this part indistinctly expanded anteriorly. Lateral lobes of male genitalia distinctly shorter than the median piece of tegmen. Body length: 1.6–1.7 mm. ..... *convexus*

24(23) Body not very convex. Femora normal. Dorsal surface black or pichy black. Elytron black with a distinct longitudinal red marking or preapical red spot, elytral suture black. Lateral lobes of tegmen of male genitalia not shorter than the median piece.

25(26) Elytral marking longitudinal and long. Usually anterior margin of pronotum infuscated or pronotum reddish with a basal dark marking. Lateral lobes of tegmen of male genitalia slightly

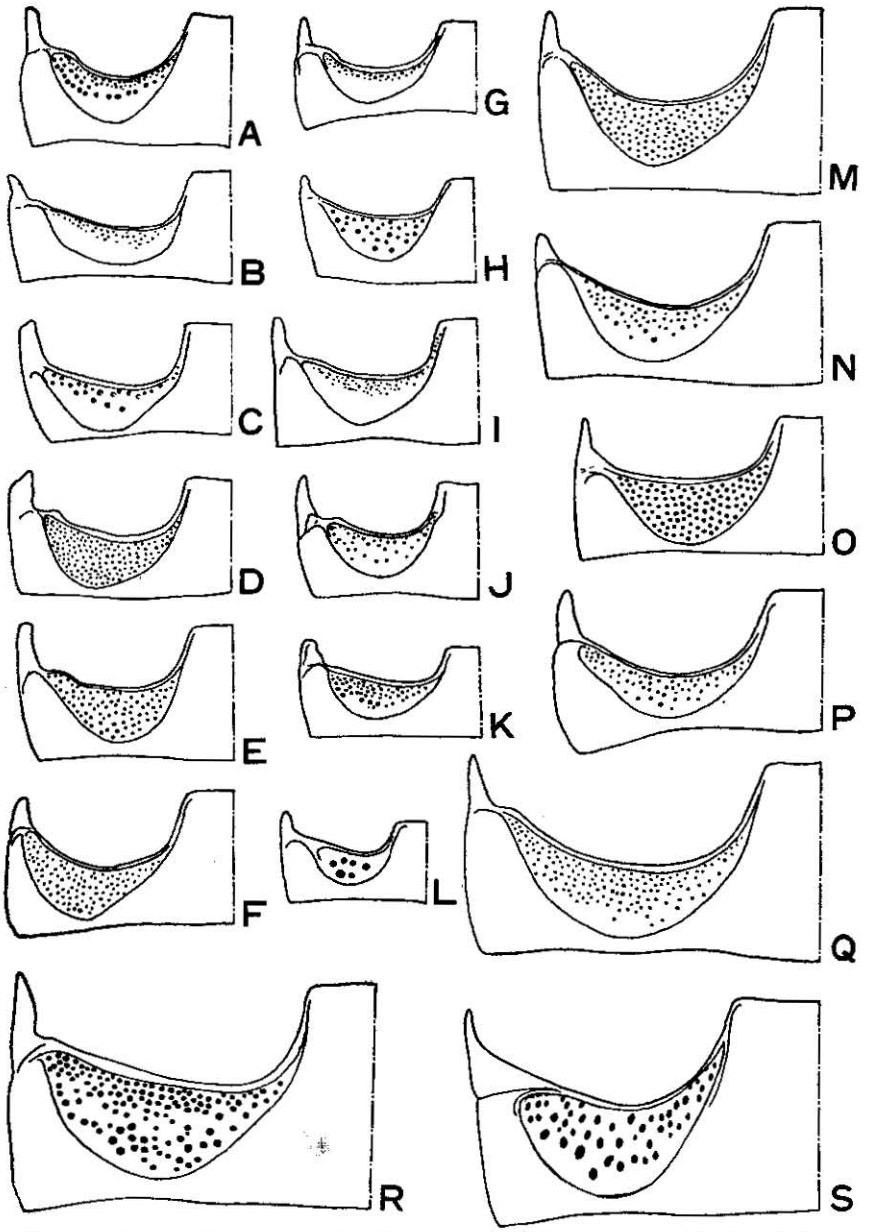

Fig. 1. Halves of the first abdominal sterna of the subgenus *Pullus* of the genus *Scymnus*, showing the femoral lines.

A. *contemptus*, B. *dorcatomoides*, C. *convexus*, D. *hoffmanni*, E. *kawamurai*, F. *ruficeps*, G. *rectus*, H. *takaraensis*, I. *sodalis*, J. *kaguyahime*, K. *miyatakei*, L. *otohime*, M. *yamato*, N. *takabayashii*, O. *fuscatus*, P. *hilaris*, Q. *ferrugatus japonicus*, R. *giganteus*, S. *fortunatus*.

longer than the median piece. Body length: 1.5–1.9 mm. .... *kaguyahime*

26(25) Elytron black with a small preapical red spot. Pronotum entirely black. Lateral lobes of tegmen of male genitalia very much longer than the median piece. Body length: 1.4–1.6 mm. ..... *otohime*

27(15) Elytra black with red apex or entirely black, but without any other markings.

28(29) Body very large in size. Dorsal surface entirely black. Direction of elytral hairs very characteristic, arranged as shown in Pl. 39–R. The hairs very fine and very dense. Body length: 2.8–3.5 mm. ..... *giganteus*

29(28) Body large or moderate in size. Usually apex of elytron more or less paler, rarely entirely black. Direction of elytral hairs rather normal.

30(33) Sipho of male genitalia with a vary characteristic apical structure, i. e. with a very long thread-like process. Body rather long. Elytra without distinct strongly punctured striae along the suture.

31(32) Pronotum reddish with a basal black marking. Apex of sipho differs from that of the next species as shown in Fig. 5–C. Body length: 2.4–3.1 mm. ..... *ferrugatus japonicus*

32(31) Pronotum black, rarely anterior margin reddish but narrow; Apex of sipho as shown in Fig. 5–E. Body length: 2.8–3.0 mm. ..... *takabayashii*

33(30) Apex of sipho of male genitalia without a very long thread-like process. Elytra with distinct strongly punctured striae along the suture; if not so, body narrow and not large in size, elytral punctures very strong.

34(37) Pronotum reddish with a basal black marking or pronotum black with a rather wide reddish anterior margin. Elytral hairs long and sparse. Body shape oval.

35(36) Median piece of tegmen of male genitalia distinctly longer than lateral lobes. Elytral punctures stronger than the next species. Basal black marking of pronotum rather large. Body length: 2.0–2.4 mm. ..... *kawamurai*

36(35) Median piece of tegmen of male genitalia slightly shorter than lateral lobes. Elytral punctures very fine. Basal black marking usually rather small. Body length: 2.0 mm. ..... *sodalis*

37(34) Pronotum black, if anterior margin reddish, the reddish margin very narrow. Body shape oblong oval or elongate oval. Elytral hairs rather short.

38(39) Lateral lobes of tegmen of male genitalia distinctly longer than median lobes; apex of sipho distinctly triangular. Body

oblong oval in shape and rather large in size. Elytra with a narrow red apex, and with strongly punctured striae along the suture. Body length: 2.2–2.4 mm. ..... *hilaris*

39(38) Lateral lobes of tegmen of male genitalia distinctly shorter than the median lobe, apex of sipho not distinctly triangular. Body elongate oval in shape and rather small in size. Elytra with the rather wide red apex, and without distinct strongly punctured striae along the suture. Body length: 2.0–2.2 mm. ..... *ruficeps*

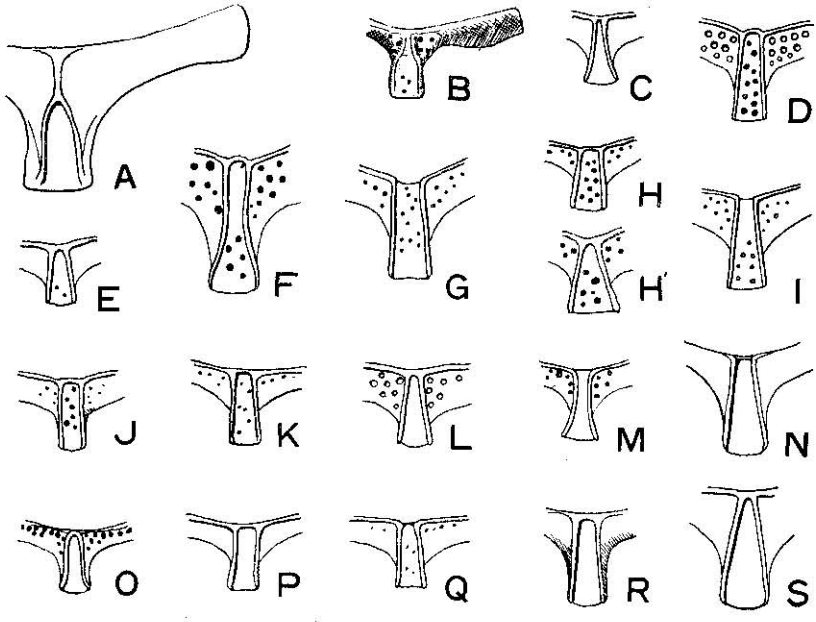

Fig. 2. Prosterna of the species of the subgenus *Pullus*, ventral aspect.
A. *fortunatus*, B. *convexus*, C. *kaguyahima*, D. *yamato*, E. *otohime*, F. *giganteus*, G. *ferrugatus japonicus*, H, H'. *hoffmanni*, I. *fuscatus*, J. *comtemptus*, K. *miyatakei*, L. *takaraensis*, M. *sodalis*, N. *takabayashii*, O. *rectus*, P. *dorcatomoides*, Q. *kawamurai*, R. *hilaris*, S. *ruficeps*.

Scymnus (*Pullus*) *fortunatus* Lewis, 1896

(Pl. 39–S; Fig. 1–S, Fig. 2–A, Fig. 3–D)

Scymnus fortunatus Lewis, 1896: Ann. Mag. nat. Hist. Ser. 6, 17: 38–39 (Nagasaki).
Scymnus (*Scymnus*) *fortunatus* Mader, 1955: Ent. Arb. Mus. Frey 6 (3): 939.

This most beautiful species was originally described by Lewis based upon a unique specimen from Nagasaki. Afterwards this has

never been recorded. Ohta (1929) listed it under the genus *Scymnus* (s. str.) without examining the specimen. In his monograph, Mader (1955) treated this as belonging to the subgenus *Scymnus*, following Ohta's treatment. But, this species has a complete femoral line of the first abdominal sternum. Thus the species must belong to the subgenus *Pullus*.

Colour pattern and some other characters are shown in the key and illustrated in this paper. Following is an additional note to the original description.

Prosternal carinae inverted Y-shape, strongly converging basally and confluent to each other on the base of prosternal process, not paired on the basisternum. Femoral line of the first abdominal sternum complete, very strongly bending as shown in the figure. Area surrounded by the femoral line very strongly and sparsely punctured; each puncture not round but elongate oval and very much large.

Male genitalia: sipho short, robust, distinctly converging apically; strongly curved, circular; inner process of siphonal capsule rather long, outer process very short; apex of sipho simple and bending outwardly near the apex. Tegmen rather large, median piece of tegmen boat-like in shape in ventral aspect, apex of median piece pointed; lateral lobes of tegmen one and one-fourth times as long as median piece, each side straight in lateral aspect and parallelsided; basal piece of tegmen very short; median strut of tegmen slightly longer than the remaining portion of tegmen.

Body length: 3.0–3.2 mm.; width: 2.0–2.2 mm.

Distribution: Japan (Hokkaido, Honshu, Kyushu).

Specimens examined: 1 ♂, Mt. Kasuga, Nara Pref., 27. vii. 1941, K. Taniguchi leg.; 1 ex., 8. vi. 1958, T. Shibata leg.; 1 ♀, Karikatsu, Tokachi Prov., Hokkaido, 25. vii. 1918, M. Suzuki leg.; 1 ex., Mt. Inunaki, Fukuoka Pref., 8. iv. 1961, T. Saigusa leg.

Scymnus (*Pullus*) *sapporensis* (Ohta, 1929)

(Pl. 39–B)

Pullus sapporensis Ohta, 1929: Ins. Mats. 4 (1/2): 7 (Hokkaido: Berg Moiwa in Sapporo).
Scymnus (*Pullus*) *sapporensis* Korschefsky, 1931: Junk's Col. Cat. 118: 136.

The present species was originally described from Sapporo based upon a unique specimen. The author examined the holotype specimen which was preserved in Hokkaido University. Unfortunately, however, the type specimen is in a too bad condition to describe detailed structure.

Body length: 1.7 mm.; width: 1.2 mm.

Distribution: Japan (Hokkaido).

Specimen examined: 1 ex., Mt. Moiwa, Sapporo, Hokkaido (holotype).

Scymnus (*Pullus*) *yamato* H. Kamiya, sp. nov.

(Pl. 39–T; Fig. 1–M, Fig. 2–D)

Body very large in size, elongate oblong oval, pichy black, clypeus reddish brown, elytron with an indistinct longitudinal dark reddish brownish part reaching the apex, or elytron dark reddish brown and fuscately margined except apical margin; epipleuron of elytron dark red; antennae, mouth parts and legs reddish brown; apical margin of abdomen reddish.

Head rather small, three-sevenths as wide as body, frons scarcely convex, closely and somewhat strongly punctured; clypeus slightly narrower than interocullar distance, anterior portion distinctly margined and emarginated roundly.

Pronotum nearly transverse quadrate, parallel-sided at the basal half, arched at the apical half. Anterior and posterior angles somewhat angulate; basal and lateral margins marginated, anterior margin weakly margined except a median part. Punctures of pronotum very close and strong.

Scutellum rather small, regular triangular, each margin arched, closely punctured.

Elytron very long, parallel-sided. Humeral angles strongly raised. Apex of elytra rounded; punctuation of elytra very strong, as close as pronotum. Direction of elytral hairs characteristically arranged as shown in Pl. 39–T.

Prosternal carinae straight, slightly converging basaly; basisternum and inner part bounded by the prosternal carinae strongly punctured. Femoral line of the first abdominal sternum complete, strongly arched, reaching apical one-ninth the length of sternum; area surrounded by the femoral line uniformly and very densely punctured.

Body length: 2.5–3.0 mm.; width: 1.5–1.7 mm.

Distribution: Japan (Honshu, Kyushu).

Holotype (♀): Fukuoka City, Kyushu, 15. iv. 1929, M. Matsuo & S. Hashimoto leg.

Paratype: 1♀, Komaba, Tokyo, Honshu, 13. vii. 1956, K. Masumoto leg.

Scymnus (*Pullus*) *fuscatus* Boheman, 1858

(Pl. 39–K; Fig. 1–O, Fig. 2–I, Fig. 3–F)

Scymnus fuscatus Boheman, 1858: Eugenies Rasa: 208 (India).
Scymnus (*Scymnus*) *fuscatus* Korschefsky, 1931: Junk's Col. Cat. 118: 143.
Scymnus (*Pullus*) *fuscatus* Mader, 1955: Ent. Arb. Mus. Frey 6 (3): 908.
Scymnus brunnescens Motschulsky, 1866: Bull. Mosc. 39 (11): 425 (Ceylon).
Scymnus brunnescens Weise, 1885: Stett. ent. Zeit. 46: 236 (Birma, Japan).
Scymnus (*Pullus*) *brunnescens* Winkler, 1927: Col. Cat. Reg. Palaearct. 7: 763.
Scymnus fuscatus ab. *brunnescens* Mader, 1955: Ent. Arb. Mus. Frey 6 (3): 908.
Scymnus niponicus Lewis, 1896: An. Mag. nat. Hist. Ser. 6, 17: 37 (Yokohama and Nagasaki) (**syn. nov.**).
Scymnus niphonicus Matsumura, 1907: Kat. Nütz. Ins. Jap.: 62.
Scymnus (*Nephus*) *niponicus* Kurisaki, 1923: Ins. World, Gifu 27 (14): 15.
Pullus niponicus Ohta, 1929: Ins. Mats. 4 (1/2): 3. (pars.).
Pullus niponicus ab. *nigriceps* Ohta, 1929: Ins. Mats. 4 (1/2): 3 (**syn. nov.**).
Pullus niponicus ab. *munagronis* Ohta, 1929: Ins. Mats. 4 (1/2): 3 (**syn. nov.**).

The present species is widely distributed on the Oriental Region and Eastern Asia and very variable in coloration. *Sc. brunnescens* Motschulsky was first recorded from Japan by Weise (1885). Mader (1955) regarded that *Sc. brunnescens* was a form of *Sc. fuscatus* Boheman. The author is of the opinion that it is not necessary to divide it into forms and both are only the individual variations within the species. On the other hand, *Sc. niponicus* Lewis, 1896 may be a synonym of the present species. The specimens which were identified as *niponicus* by Mr. Y. Ohta and are preserved in the Entomological Institute of Hokkaido University include the present species, *fuscatus* and the next species, *hoffmanni*.

The Loochoos' specimen of *Sc. fuscatus* were further described in detail with good illustrations including the genitalia of both sexes by M. Miyatake (1959). Following is the addition to the descriptions made by Miyatake and Mader. Each hair on elytra comparatively long and sparse; direction of elytral hairs arranged in rather gently as shown in Pl. 39–K. Japanese specimens are generally darker in coloration than the Loochoos' specimens and the darkest type has the pronotum almost pichy black, a longitudinal marking on each elytron very narrow, dark red or indistinct.

Body length: 2.0–2.3 mm.; width: 1.3–1.5 mm.

Distribution: Japan (Honshu, Shikoku, Kyushu), the Loochoos (Amami-Ôshima, Okinawa, Ishigaki-jima, Miyako-jima), China, Formosa, Philippines, Sumatra, Burma, Ceylon, India.

Specimens examined: Many examples from the following localities:
Mie Pref.: Tsu City (vii, H. Ichihashi).
Tokushima Pref.: Uetsuno (vi, I. Hiura).
Kôchi Pref.: Mt. Tebako (vi, K. Morimoto).

Fukuoka Pref.: Fukuoka City (vii, H. Kamiya); Mt. Wakasugi (v, H. Kamiya); Mt. Mikuni (viii, Ishibashi); Mt. Hikosan (vi, Y. Miyatake).
Kumamoto Pref.: Kumamoto City (viii, N. Tamura).
Ôita Pref.: Mt. Sobosan (viii, S. Ikushima).
Ishigaki-jima Is.; Nagure (24. vi. 1960, K. Yasumatsu).
Miyako-jima Is.: Hirara (26. xi. 1960, K. Yasumatsu).

Scymnus (*Pullus*) *hoffmanni* Weise, 1879

(Pl. 39–E; Fig. 1–D, Fig. 2–H, Fig. 3–E)

Scymnus hoffmanni Weise, 1879: Deutsch. ent. Zeitschr. 23: 152 (Japan).
Pullus hoffmanni Jocobson, 1905: Käf. Russ. West-Eur.: 974.
Scymnus (*Nephus*) *hoffmanni* Kurisaki, 1925: Ins. World, Gifu 27 (14): 16.
Scymnus (*Pullus*) *hoffmanni* Winkler, 1927: Cat. Col. Palerarct. 7: 764.

In central and southern parts of Japan and the Loochoos, the present species is very common and resembles the preceeding species in general appearance but distinguishable from the latter by the characters stated in the key. General characters were shown by M. Miyatake (1959).

Body length: 1.6–2.4 mm.; width: 1.1–1.5 mm.

Distribution: Japan (Honshu, Shikoku, Kyushu), the Loochoos (Amami-Ôshima), Korea, China.

Specimens examined: Many examples from the following localities:
Toyama Pref.: Furusato Village (x, I. Hiura).
Fukui Pref.: Fukui City (viii, Y. Murakami).
Kanagawa Pref.: Noborito, Kawasaki (xi, Y. Tominaga).
Kôchi Pref.: Jinzenji, Kôchi City (v, K. Morimoto).
Fukuoka Pref.: Takeshita (xii, T. Shirôzu); Fukuoka City and its suburbs (v–ix, H. Kamiya, etc.); Mt. Kôrasan (ix, Y. Miyatake).
Kagoshima Pref.: Kagoshima (v, T. Hidaka); Izashiki (v, I. Hiura); Unagi-ike (x, T. Hidaka); Yamakawa (v, I. Hiura); Cape Sata (x, Y. Tominaga).

Scymnus (*Pullus*) *takaraensis* Nakane et Araki, 1959

(Pl. 39–G; Fig. 1–H, Fig. 2–L)

Scymnus (*Pullus*) *takaraensis* Nakane et Araki, 1959: Sci. Rep. Kyoto Pref. Univ. (Nat. Sci. Living Sci.) 3 (1): 46, figs. (Tokara Islands).

This species was described originally by Nakane and Araki based upon a unique female specimen and differs from any other *Pullus*-species from Japan and the Loochoos by entirely brown coloration and the

small size. The author gives the figures of full body, prosternal process and the first abdominal sternum. But he could not observe the direction of the dorsal hairs owing to the condition of the holotype, the hairs of which are artificially scraped off.

Body length: 1.8 mm.; width: 1.1 mm.

Distribution: The Loochoos (the Tokara Islands).

Specimen examined: 1♀, Takarajima, the Tokara Islands, the Loochoos, 29. v. 1953, T. Nakane leg. (holotype is preserved in T. Nakane's collection).

Scymnus (Pullus) kaguyahime H. Kamiya, sp. nov.

(Pl. 39–H; Fig. 8–J, Fig. 2–C, Fig. 3–A)

Body oval, small in size; ground colour of the dorsal surface pichy black, head reddish brown; pronotum brown or pichy black, blackish in front of scutellum, scutellum black, elytron with a longitudinal red marking, sutural part of elytron black, lateral margin and apical margin of elytron darker; underside of the body generally brown, legs yellow. The coloration of the present species is variable. In the palest specimen of the paratypes, ground colour of the dorsal surface yellowish brown, pronotum with a blackish indistinct marking on the basal area and basal and sutural parts of elytron black; underside of the body generally yellowish brown except the dark part of the middle of meso- and metasternum and the basal three abdominal sterna.

Frons weakly convex, rather wide, closely and finely punctured; clypeus very short, anterior margin scarcely emarginated.

Pronotum transverse, anterior margin of pronotum produced anteriorly; and posterior margin of pronotum emarginated, lateral margins of pronotum arched, converging anteriorly; anterior angles angulated; margination of posterior margin narrow; punctuation of pronotum finer and denser than that of frons.

Scutellum triangular and slightly convex, with very fine punctures.

Elytra moderately convex, with coarse and weak punctures; direction of elytral hairs arranged as shown in Pl. 39–H.

Prosternal process broadening apically, prosternal carinae curved and strongly converging anteriorly, and almost touching each other at anterior margin of prosternum. Femoral line of the first abdominal sternum roundly arched as shown in Fig. 1–J; area surrounded by the femoral line very sparsely and weakly punctured, relatively denser near the basal margin of sternum. The posterior margin of the fifth visible abdominal sternum of male slightly emarginated at middle; in female not emarginated but rounded.

Male genitalia: sipho short, three times as long as tegmen except a median strut when sipho is straightened without siphonal capsule. Apical half of sipho weakly bisinuate and basal one-fourth strongly curved. Siphonal capsule with a small inner process and a long outer process; outer process of siphonal capsule being straight with sipho. Tegmen comparatively large; median piece of tegmen with a strongly pointed and produced apex; lateral lobes of tegmen large and as long as median piece of tegmen. Median strut less longer than the remaining part of tegmen.

Body length: 1.5–1.9 mm.; width: 0.9–1.2 mm.

Distribution: Japan (Kyushu).

Holotype (♂): Kashii, near Fukuoka City, Kyushu, 24. viii. 1958, S. Miyamoto leg.

Allotype (♀): Fukuoka City, 10. vi. 1958, S. Miyamoto leg.

Paratypes: 1♂, Mt. Wakasugi, near Fukuoka City, 14. iv. 1959, H. Kamiya leg.; 2♂♂ 4♀♀, Ropponmatsu in Fukuoka City, 16. ix. 1959, S. Miyamoto leg.; 1♀, Kashii, near Fukuoka City, 24. viii. 1958, S. Miyamoto leg.; 1♂, same locality, 26. vii. 1958, S. Miyamoto leg.; 1♀, Uearata-cho, Kagoshima City, 26. i. 1957, H. Maebara leg.

Scymnus (*Pullus*) *otohime* H. Kamiya, sp. nov.

(Pl. 39–I; Fig. 1–L, Fig. 2–E, Fig. 3–B)

Body short oval, small in size; black, a pair of red spots on elytra being long oblique oval and near latero-apical margin of elytra; legs brownish; anterior margin of pronotum slightly paled very narrowly

Head small, two-fifths as wide as body width, eyes comparatively small, frons with very distinct coarse punctures, clypeus distinctly converging anteriorly.

Pronotum pentagonal, strongly convergent anteriorly, anterior angles of pronotum somewhat angulate, posterior margin of pronotum marginated and weakly angulate at middle, each half of posterior margin of pronotum straight. Punctuation of pronotum closer than that of frons. Scutellum triangular, very finely punctured.

Elytra convex, widest at middle of the body or at slightly posterior part; lateral margins distinctly arcuate. Punctuation of elytra very strong and coarse, weaker along the suture. Direction of elytral hairs arranged as shown in Pl. 39–I.

Prosternal process rather short, prosternal carinae strong and weakly anteriorly narrowing. Femoral line of the first abdominal sternum complete, short, reaching apical one-fifth the length of sternum, area surrounded by the femoral line with a few very strong punctures.

Male genitalia: sipho slender, rather weakly arched in whole length; siphonal capsule with a long inner process and a short outer process; apex of sipho characteristic as shown in Fig. 3-B. Median piece of tegmen very short; lateral lobes of tegmen longer than one and half of a median piece. Median strut very slender, distinctly longer than the remaining part of tegmen.

Body length: 1.4–1.6 mm.; width: 0.9–1.1 mm.

Distribution: Japan (Honshu, Kyushu).

Holotype (♂): Hikosan, Fukuoka Pref., Kyushu, 4–9. viii. 1958, K. Morimoto leg.

Allotype (♀): Mt. Wakasugi, Fukuoka Pref., 13. v. 1958, K. Morimoto leg.

Paratypes: 1♂, Mt. Wakasugi, Fukuoka Pref., 30. viii. 1954, H. Kamiya leg.; 3♂♂, same locality, 13. v. 1958, K. Morimoto leg.; 1♀, same locality, 3. v. 1957, K. Morimoto leg.; 1♀, same locality, 21. v. 1957, K. Morimoto leg.; 1♀, Mt. Atago, Fukuoka City, 4. vi. 1957, H. Kamiya leg.; 1♂ 1♀, Hirao, Fukuoka City, 21. vi. 1958, Y. Miyatake leg.

Scymnus (*Pullus*) *convexus* H. Kamiya, sp. nov.

(Pl. 39–F; Fig. 1-C, Fig. 2–B, Fig. 3–C)

Body oval, strongly convex, rather shining, dorsal surface pichy black, head reddish brown, anterior half of pronotum reddish brown but its border indistinct; apical two-fifths of elytron reddish brown, its border indistinct and middle of elytron indistinctly and slightly paled longitudinally. Underside reddish brown in general, pterosternum and the first abdominal sternum pichy black; mouth parts and legs reddish or yellowish brown.

Head moderate in size, eyes comparatively large, frons finely and sparsely punctured in middle and punctuation of the lateral portions of frons distinctly stronger and closer than that of middle; lateral margins of frons slightly arched and margined; clypeus short, narrower than frons; anterior margin of clypeus rather widely margined.

Pronotum subtrapezoid in form, basal margin roundly arched, comparatively narrowly margined; anterior margin bisinuate, weakly and very narrowly margined; lateral parts of pronotum quadrate; anterior angle distinctly angulate. Pronotum very finely and densely punctured.

Scutellum triangular, latero-posterior margin somewhat arched; slightly convex at middle. Elytra strongly convex; apex of elytra weakly reflexed somewhat widely. Punctuation of elytra with two series; one of them very strong and sparse, each puncture longitudi-

nally ovate; the other series of them very fine and as sparse as the latter. A pair of strongly punctured striae being along the elytral structure.

Basisternum of prothorax narrow, prosternal process long, twice as long as basisternum; prosternal carinae rather weak; strongly narrowed at anterior one-third. Femoral line of the first abdominal

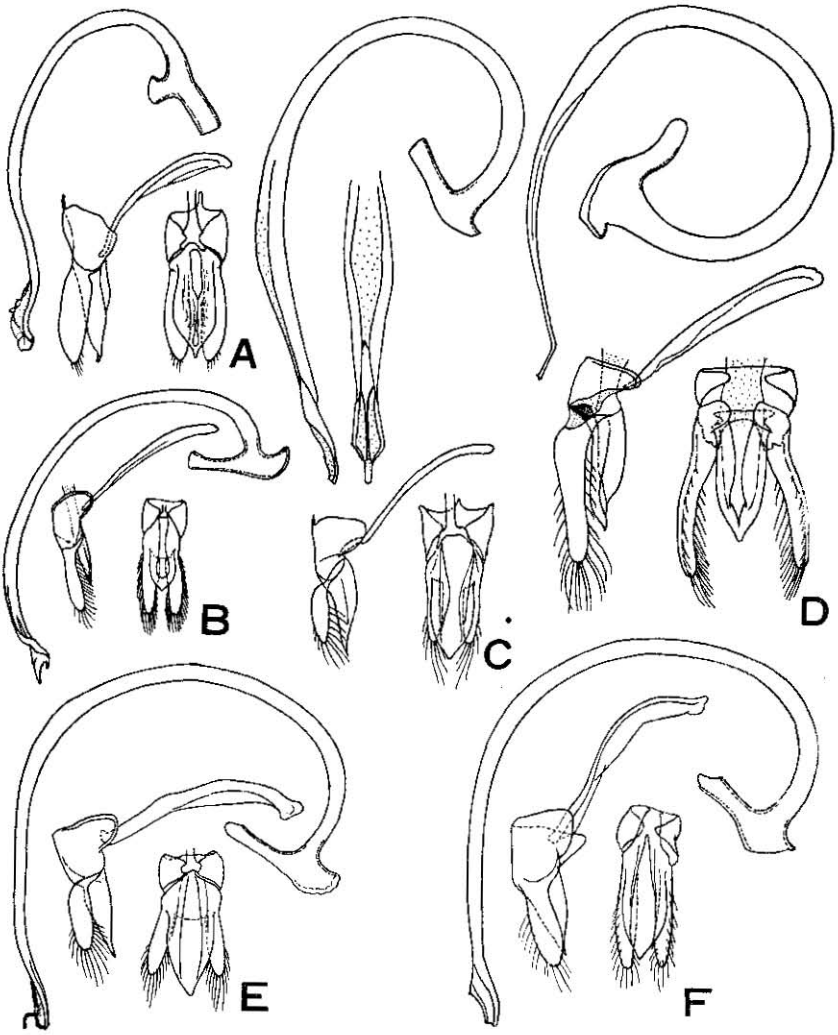

Fig. 3. Male genitalia. A. *Scymnus (Pullus) kaguyahime* H. Kamiya, sp. nov., B. *Sc. (P.) otohime* H. Kamiya, sp. nov., C. *Sc. (P.) convexus* H. Kamiya, sp. nov., D. *Sc. (P.) fortunatus* Lewis, E. *Sc. (P.) hoffmanni* Weise, F. *Sc. (P.) fuscatus* Boheman.

sternum very largely arched, reaching near the posterior margin of the sternum; area surrounded by the femoral line with very strong and very sparse punctures near the base. Femora comparatively robust.

Male genitalia: sipho stout and long; about five and half as long as the tegmen without a menian strut when sipho is straightened; sipho swollen at apical one-third; basal one-third of sipho rather strongly curved; siphonal capsule with a long inner process and an indistinct outer process; apex of sipho complicated as shown in Fig. 3-C. Median piece of tegmen wide and flat in ventral aspect; lateral lobe of tegmen small and distinctly shorter than the median piece of tegmen; median strut of tegmen very slender, distinctly longer than the remaining part of tegmen.

Body length: 1.6–1.7 mm.; width: 1.1 mm.

Distribution: Japan (Shikoku, Kyushu).

Holotype (♂): Monobe-mura, Kôchi Pref., Shikoku, 26–28. viii. 1958, K. Morimoto leg.

Allotype (♀): Mt. Hikosan, Fukuoka Pref., Kyushu, 12. vii. 1955, H. Kamiya leg.

Paratype: 1 ♂, the same data as the holotype.

Scymnus (*Pullus*) *contemptus* (Weise, 1923)

(Pl. 39-D; Fig. 1-A, Fig. 2-J, Fig. 4-A)

Pullus contemptus Weise, 1923: Archiv Naturgesch. 89, A (2): 186–187 (Formosa: Kankau, Anping).

Scymnus (*Pullus*) *contemptus* Korschefsky, 1931: Junk's Col. Cat. 118: 145.

Body short oval, ratio between the length and width being 1.39–1.49; lateral margins of the body outline in dorsal aspect gently rather strongly convex; body yellowish red, mesosternum yellowish brown, metasternum black, elytra black with apical one-third or two-fifths yellowish red, the border between the reddish apical marking and the remaining black ground indistinct; scutellum brownish or reddish brown.

Head with rather large eyes; inner margin of each eye distinctly arched. Frons comparatively closely and strongly punctured; clypeus comparatively long, anterior margin of clypeus distinctly incised and margined, latero-anterior angles of clypeus gently rounded.

Pronotum subpentagonal; lateral margins strongly converging anteriorly; latero-anterior angles rather distinctly angulated; punctures on pronotum regularly close and strong. Scutellum subpentagonal, without any puncture or with a few fine punctures.

Elytra very convex; rather closely and strongly punctured at basal and wide lateral portions; very finely near the elytral suture; each

elytron with two very strongly punctured striae along the suture. Direction of elytral hairs arranged as shown in Pl. 39–D.

Prosternal carinae parallel. Femoral line of the first abdominal sternum complete, strongly arched. Area surrounded by the femoral line rather strongly punctured at basal half and apical half without punctures.

Male genitalia: sipho moderately slender, rather strongly curved as shown in Fig. 4–A. Apex of sipho characteristic. Inner process of the siphonal capsule very long, outer process short. Median piece of tegmen wide with a strongly pointed apex in ventral aspect. Lateral lobes rather slender, slightly shorter than the median piece.

Body length: 1.8–2.1 mm.; width: 1.2–1.5 mm.

Distribution: Japan (Honshu, Shikoku, Kyushu), the Loochoos (Okinawa, Amami-Ôshima), Formosa.

Specimens examined: 2 exs., Kukisaki, Mie Pref., Honshu, 2. vi. 1958, H. Ichihashi leg.; 1 ex., Kuroson, Kôchi Pref., Shikoku, 29. iv. 1958, K. Morimoto leg.; 1 ex., Haraigawa, Kanoya City, Kagoshima Pref., 12. v. 1957, H. Fukuda leg.; 1 ex., Yunono, Mt. Kirishima, Kagoshima Pref., 4. vi. 1955, H. Maebara leg.; 1 ex., Shiroyama, Kagoshima City, 16. v. 1956, H. Maebara leg.; 1 ex., Gusuku—Nishinakama, Amami-Ôshima, 15. vii. 1933, T. Esaki & K. Yasumatsu leg.; 1 ex., Shinmura, Amami-Ôshima, 23. vii. 1954, S. Miyamoto & Y. Hirashima leg.; 1 ex., Izumi, Okinawa, 15. vii. 1958, T. Hidaka leg.; 1 ex., Shuri, Okinawa, 19–21. vii. 1958, T. Hidaka leg.

The present species was originally described from Formosa and this is the first record of the species from Japan.

Scymnus (*Pullus*) *rectus* (Ohta, 1929)

(Pl. 39–A; Fig. 1–G, Fig. 2–O, Fig. 4–B)

Pullus rectus Ohta, 1929: Ins. Mats. 4 (1/2): 4–5 (Kyushu: Kumamoto).
Scymnus (*Pullus*) *rectus* Korschefsky, 1931: Junk's Col. Cat. 118: 134.

Both prosternal carinae connected at the anterior and making a round angle. Femoral line of the first abdominal sternum as shown in Fig. 1–G and area surrounded by the femoral line with dense punctures near the basal margin.

Male genitalia: sipho very slender; apical one-third of sipho slightly waving and narrowing apically. The remining basal part of sipho roundly curved; siphonal capsule with distinct inner and outer processes, the inner one longer than the outer one. Tegmen stout; median piece of tegmen converging apically; the apex of the median piece not reaching the apex of the lateral lobes; basal piece of tegmen rather large.

Body length : 1.5–1.8 mm. ; width : 1.1–1.3 mm. ; L/W : 1.32–1.45.

Distribution : Japan (Kyushu).

Specimens examined : 2 exs., Fukuoka City, Kyushu, 1. ii. 1957, H. Kamiya leg. ; 1 ex., 7. vi. 1955, H. Kamiya leg. ; 3 exs., Nagasaki City, Y. Nonaka leg.

The specimens which were recorded under the name *rectus* from the Loochoos by M. Miyatake (1959) and from the Tokara Islands by Nakane and Araki (1959) may be the new species, *miyatakei*.

Scymnus (*Pullus*) *dorcatomoides* Weise, 1879

(Pl. 39–J ; Fig. 1–B, Fig. 2–P, Fig. 4–D)

Scymnus dorcatomoides Weise, 1879 : Deutsch. ent. Zeitschr. 32 (1) : 151-152 (Hagi und Yokohama).
Pullus dorcatomoides Jacobson, 1905 : Käf. Russ. West-Eur. : 974.
Scymnns (*Pullus*) *dorcatomoides* Kurisaki, 1923 : Ins. World, Gifu 27 (14) : 16.
Pullus dorcatomoides ab. *ferrugineus* Ohta, 1929 : Ins. Mats. 4 (1/2) : 4 (Honshu : Ogikubo, Chuzenji, Berg Fuji ; Shikoku : Iyo) **(syn. nov.)**.

The present species is very commonly found in Japan.

Male genitalia : sipho slender, four times as long as tegmen without a median strut when sipho is straightened longtudinally apical half of sipho straight ; basal half of sipho rather weakly curved ; siphonal capsule with distinct inner and outer processes. Tegmen slender, lateral lobes distinctly longer than the median piece.

Body length : 1.8 mm. ; width : 1.1–1.4 mm. ; L/W : 1.55–1.65.

Distribution : Japan (Hokkaido, Honshu, Shikoku, Kyushu).

Specimens examined : Many examples from the following localities:
Hokkaido : Junsai-numa (vii, H. Kamiya) ; Hakodate (vii, H. Kamiya) ; Aizankei, Mt. Daisetsu (vii, S. Kimoto) ; Nukabira (vii, H. Kamiya).
Miyagi Pref. : Sendai (vii, K. Morimoto).
Toyama Pref. : Yatsuochô (x, I. Hiura).
Nagano Pref. : Shirahone (vii, S. Kimoto) ; Shiojiri (viii, S. Miyamoto).
Kanagawa Pref. : Kamakura (iv, T. Yôrô) ; Zushi (vi, T. Yôrô).
Tottori Pref. : Mt. Daisen (vi, S. Kimoto).
Kôchi Pref. : Monobe-mura (viii, K. Morimoto).
Fukuoka Pref. : Mt. Hikosan (v–viii, H. Kamiya, etc.) ; Mt. Fukuchi (v, S. Kimoto) ; Fukuoka City and its suburbs (v–viii, H. Kamiya, etc.) ; Mt. Kôrasan (ix, Y. Miyatake).
Ôita Pref. : Mt. Sobosan (vii, S. Kimoto) ; Mt. Kujû (vii, Y. Miyatake).
Nagasaki Pref. : Nagasaki City and its suburbs (vii–ix, H. Kamiya) ; Is. Takashima (vii, H. Kamiya).
Kagoshima Pref. : Cape Sata (v, S. Kimoto).

Scymnus (*Pullus*) *miyatakei* H. Kamiya, sp. nov.

(Pl. 39-C; Fig. 1-K, Fig. 2-K, Fig. 4-C)

Scymnus (*Pullus*) *rectus* (nec Ohta, 1929) Miyatake, 1959: Mem. Ehime Univ. Sect. VI, 4 (2): 133-134, figs. (Amami-Ôshima, Okinawa). **(syn. nov.)**

Body long oval, lateral margins of body outline in dorsal aspect slightly curved. Head, prothorax, legs and abdomen except the first sternum reddish yellow; the first abdominal sternum black; elytron black with a reddish apical marking; the apical marking one-fifth or one-fourth as wide as elytral length; the border between the marking and ground colour part distinct and often weakly arched anteriorly. Scutellum brownish black.

Head with rather large eyes; frons coarsely and finely punctured. The anterior margin of clypeus nearly flat. Pronotum short, half as long as wide; lateral margins of pronotum weakly converging anteriorly; punctuation of pronotum very coarse and very fine. Scutellum regular triangular, with fine punctures; surface of scutellum flat. Elytron not strongly convex; the punctuation of elytron fine but distinctly stronger and sparser than that of pronotum. Direction of elytral hairs arranged as shown in Pl. 39-C.

Prosternal carinae nearly parallel. Femoral line of the first abdominal sternum complete, rather short. Area surrounded by the femoral line densely and relatively strongly punctured except a part along the femoral line.

Male genitalia: sipho slender, three and half times as long as the the tegmen except the median strut when sipho is straightened; apical half of sipho scarcely waving; basal half of sipho comparatively weakly curved; siphonal capsule with a long inner process and an indistinct outer process. Tegmen stouter than that of *dorcatomoides*. Median piece of tegmen comparatively large; lateral lobes of tegmen distinctly shorter than the median piece. Median strut of tegmen curved.

Body length: 1.7-2.0 mm.; width: 1.0-1.3 mm.; L/W: 1.56-1.66.

Distribution: The Loochoos (Amami-Ôshima, Okinawa).

Holotype (♂): Shinmura, Amami-Ôshima, 4-5. iv. 1956, S. Miyamoto leg.

Allotype (♀): Yuwan, Amami-Ôshima, 7-9. iv. 1956, S. Miyamoto leg.

Paratypes: 3 exs., same data as the allotype; 1 ex., Naze, Amami-Ôshima, 13. vii. 1938, T. Esaki & K. Yasumatsu leg.; 1 ex., Shinmura, Amami-Ôshima, 23. vii. 1954, S. Miyamoto & Y. Hirashima leg.; 1 ex., Santarô-tôge, Amami-Ôshima, 26. vii. 1954, S. Miyamoto leg.; 1 ex., Chinen, Okinawa, 6. xi. 1960, K. Yasumatsu leg.; 2 exs., Ôsato, Okinawa, 8. xi. 1960, K. Yasumatsu leg.; 1 ex., Gogayama, Okinawa, 15. xi. 1960, K. Yasumatsu leg.

The preceeding four species, *contemptus, rectus, dorcatomoides* and *miyatakei*, are very closely allied to each other, but distinguishable as shown in the key.

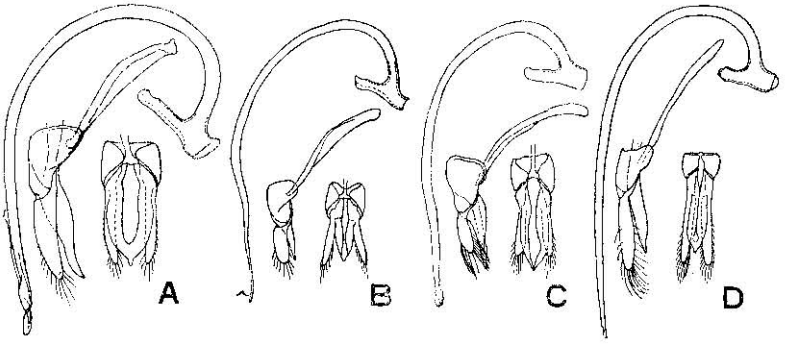

Fig. 4. Male genitalia. A. *Scymnus (Pullus) contemptus* Weise, B. *Sc. (P.) rectus* Ohta, C. *Sc. (P.) miyatakei* H. Kamiya, sp. nov., D. *Sc. (P.) dorcatomoides* Weise.

Scymnus (Pullus) giganteus H. Kamiya, sp. nov.

(Pl. 39–R; Fig. 1–R, Fig. 2–F, Fig. 5–A)

Body very large in size, oblong oval; black, anterior margin of pronotum, antennae, mouth parts, lateral and posterior margins of abdomen and legs pichy black. Body surface with very close, very short, silvery pubescence.

Head comparatively small; frons flat, closely and finely punctured; anterior margin of clypeus incised, antero-lateral angles of clypeus acute.

Pronotum short transverse quadrate, and trapezoid in form in dorsal aspect, one-fourth as long as body length and three times as wide as long; anterior angles rounded; the base of pronotum slightly narrower than elytra. Posterior margin rather narrowly margined. Punctuation of pronotum very dense and fine.

Scutellum small, triangular, latero-posterior margins arched. Punctuation of scutellum finer than that of pronotum.

Elytra long, lateral margin slightly arched and nearly parallel, apex of elytra rounded. Punctuation of elytra fine as well as pronotum. Direction of elytral hairs very characteristic as shown in Pl. 39–R, making three or more series of the waving currents.

Underside of body strongly and closely punctured generally. Prosternal carinae narrowing anteriorly at the posterior half and parallel at anterior half. Femoral line of the first abdominal sternum complete,

largely arched, reaching posterior one-fifth of the abdominal sternum and the lateral end of the femoral line reached near the lateral margin of sternum. Area surrounded by the femoral line irregularly and strongly punctured, sometimes a posterior part near the line flat.

Male genitalia: sipho slender; basal half of sipho semicircularly curved, slightly narrowing apically; siphonal capsule with a long inner process which is widened apically and an indistinct outer process. Apex of sipho characteristic as shown in Fig. 5-A. Tegmen slender; lateral lobes slightly longer than the median piece.

Body length: 2.8–3.5 mm.; width: 1.9–2.5 mm.

Distribution: Japan (Honshu, Shikoku).

Holotype (♂): Zentsûji, Kagawa Pref., Shikoku, 14. viii. 1959, Y. Miyatake leg.

Allotype (♀): Masutomi, Yamanashi Pref., Honshu, 28. vii. 1957, S. Kimoto leg.

Paratypes: 1♂ 3♀♀, same data as the holotype; 1♀, Mt. Odayama, near Aizu-Wakamatsu, Fukushima Pref., Honshu, 25. v. 1947, Y. Kurosawa leg.; 1♀, Mt. Senaka-aburi, Higashiyama Vill., near Aizu-Wakamatsu, 14. v. 1948, Y. Kurosawa leg.; 1♀, same locality, 11. viii. 1948, Y. Kurosawa leg.; 1 ex., Hiease, Tokushima Pref., Shikoku, 5. v. 1950, I. Hiura leg.; 1 ex., Zushi, Kanagawa Pref., 11. v. 1952, T. Yôrô leg.

This new species is the largest one among the Japanese *Scymnus*-species, and distinguishable from the other species by its large size, entirely black dorsal surface and very complicated characteristic pubescence of the dorsal surface.

Scymnus (Pullus) ferrugatus japonicus Weise, 1879

(Pl. 39-O; Fig. 1-Q, Fig. 2-G, Fig. 5-C)

Scymnus ferrugatus var.? *japonicus* Weise, 1879: Deutsch. ent. Zeitschr. 1879: 151 (Japan).
Pullus ferrugatus japonicus Jacobson, 1905: Käf. Russ. East-Eur.: 974.
Scymnus (Pullus) ferrugatus japonicus Mader, 1955: Ent. Arb. Mus. Frey 6 (3): 903.

This species is rather common in Japan but not distributed in the Loochoos.

Male genitalia: sipho very stout, strongly curved as occupying three quaters of an imaginal circle in whole part; siphonal capsule with a long inner process and an indistinct outer process; apex of sipho very characteristic as shown in the figure, with a very long thread-like process. Tegmen wide in ventral aspect; lateral lobes of tegmen scarcely longer than median piece.

Body length: 2.4–3.1 mm.; width: 1.6–2.1 mm.

Distribution: Japan (Honshu, Shikoku, Kyushu).

Specimens examined: many examples from the following localities:
Kanagawa Pref.: Kamakura (i, iv, T. Yôrô).
Kôchi Pref.: Monobe-mura (viii, K. Morimoto); Mt. Tebako (viii, K. Morimoto); Kuroson (iv, Y. Murakami).
Fukuoka Pref.: Mt. Hikosan (v–viii, H. Kamiya, etc.); Mt. Inunaki (v, H. Kamiya); Mt. Fukuchi (v, H. Kamiya); Magarifuchi (vi, H. Kamiya).
Ôita Pref.: Mt. Kujû (vii, Y. Miyatake).
Nagasaki Pref.: Mt. Tara (v, H. Kamiya).

Scymnus (*Pullus*) *takabayashii* (Ohta, 1929)

(Pl. 39–N; Fig. 1–N, Fig. 2–N, Fig. 5–E)

Pullus takabayashii Ohta, 1929: Ins. Mats. 4 (1/2): 4 (Honshu: Takao in Musashi).
Scymnus (*Pullus*) *takabayashii* Korschefsky, 1931: Junk's Col. Cat. 118: 145.

This species is very allied to the preceeding species but differs from the latter in the characters shown in the keys, especially in the structure of the male genitalia.

Male genitalia: sipho narrowing apically, slightly slenderer and more weakly curved than that of *ferrugatus japonicus*; siphonal capsule with a long inner process and an indistinct outer process. Apex of sipho very characteristic as shown in the figure, having a long thread-like process with an arched sclerotized hook at the apex. Tegmen nearly as like as the preceeding species *ferrugatus japonicus* but lateral lobes of tegmen narrowing apically.

Body length: 2.8–3.0 mm.; width: 1.8–1.9 mm.

Distribution: Japan (Honshu, Shikoku, Kyushu).

Specimens examined: 1 ex., Egawa-akka, Iwate Pref., Honshu, 10. vii. 1958, K. Nishikawa leg.; 2 exs., Aoba-jô, Sendai City, Miyagi Pref., 7. vii. 1957, K. Morimoto leg.; 1 ex., Mt. Koma-ga-take, Yamanashi Pref., 20. vii. 1956, H. Kamiya leg.; Obina-yama, Yamanashi Pref., 28. vii. 1956, H. Kamiya leg.; 1 ex.; Kôfu City, Yamanashi Pref., 15. vii. 1956, H. Kamiya leg.; 1 ex., Karuizawa, Nagano Pref., 2–8. viii. 1959, H. Kamiya leg.; 2 exs., Okutama, near Tokyo, 7. viii. 1958, H. Kamiya leg.; 2 exs., same locality, 28. iv. 1957, T. Yôrô leg.; Mt. Fujiwara, Mie Pref., H. Ichihashi leg.; 1 ex., Mie Univ. Forest, Mie Pref., H. Ichihashi leg.; 1 ex., Ôsugidani, Mie Pref., 2.1–2.4 vii. 1958, T. Matoba leg.; 2 exs., Mt. Zoozu, Kagawa Pref., 1–2. v. 1958, Y. Miyatake leg.

Scymnus (*Pullus*) *hilaris* (Motschulsky, 1858)

(Pl. 39–M; Fig. 1–P, Fig. 2–R, Fig. 5–F)

Scymnus hilaris Motschulsky, 1858: Etud. Ent. 7: 119 (Ceylon).
Scymnus hilaris Weise, 1879: Deutsch. ent. Zeitshr. 23 (1): 151 (Japan).
Scymnus (*Nephus*) *hilaris* Kurisaki, 1923: Ins. World, Gifu 27 (14): 16.
Scymnus (*Pullus*) *hilaris* Winklar, 1927: Cat. Col. Palaearct.: 763.
Pullus hilaris ab. *awanus* Ohta, 1929: Ins. Mats. 4 (1/2): 8 (Hokkaido, Honshu, Shikoku und Formosa) **(syn. nov.)**.

The present species was originally described from Ceyron. This is the commonest species in Japan but the author has not examined any specimen from the Loochoos, although this species has a very wide distribution. As the author can not examine the Motschulsky's type specimen and the original description is very short, the author follows the treatment of many European authorities.

Male genitalia: sipho comparatively stout; basal two-thirds curved semicircularly; apical one-third scarcely curved; both processes of siphonal capsule rather long and the inner one distinctly longer than the outer one; sipho with an inner preapical triangular extention and a somewhat long thread-like process. Tegmen rather stout; median piece of tegmen small, nearly triangular in ventral aspect; lateral lobes of tegmen stout and distinctly longer than the median piece; median strut very stout and longer than the remaining part of tegmen.

Body length: 2.2–2.4 mm.; width: 1.5–2.0 mm.

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu, Yakushima, Izu), Formosa, Ceyron, Burma, East India.

Specimens examined: Many examples from the following localities:
Hokkaido: Ashoro (vi, vii, Y. Murakami, S. Miyamoto); Sapporo (vi, S. Miyamoto); Hakodate (vii, H. Kamiya).
Aomori Pref.: Yunomata, Shimokita Peninsula (vii, K. Morimoto).
Fukui Pref.: Mt. Murakamiyama, Takefu City (vii, Y. Murakami); Mt. Asuwa, Fukui City (vii, Y. Murakami).
Toyama Pref.: Mt. Tateyama (x, I. Hiura).
Yamanashi Pref.: Kôfu City (vii, H. Kamiya); Masutomi (vii, H. Kamiya); Obina-yama (vii, H. Kamiya); Amari-yama (vii, H. Kamiya); Kiyosato (vii, S. Miyamoto).
Tokyo Pref.: Komaba, Tokyo (vi, T. Yôrô); Oku-tama (iv, v, T. Yôrô).
Kanagawa Pref.: Zushi (vi, v, T. Yôrô); Noborito, Kawasaki (vi. Y. Tominaga); Kamakura (iv, v, vii, T. Yôrô).
Shiga Pref.: Mt. Ibuki (v, I. Hiura).
Mie Pref.: Tsu City (vi, H. Ichihashi); Mt. Fujiwara (v, H. Ichihashi).
Kyoto Pref.: Hanase-toge, Kyoto (v, K. Morimoto).
Tottori Pref.: Mt. Daisen (v, vii, S. Kimoto).
Kagawa Pref.: Zentsûji (viii, Y. Miyatake); Mt. Zoozu (v, Y. Miyatake).

Kôchi Pref.: Monobe-mura (viii, K. Morimoto); Mt. Tebako (viii, K. Morimoto); Kuroson (iv, K. Morimoto); Is. Kashiwajima (viii, K. Morimoto); Is. Okinoshima (viii, K. Morimoto).
Fukuoka Pref.: Mt. Fukuchi (iv, v, H. Kamiya, etc.); Mt. Hikosan (v–viii, H. Kamiya, etc.); Fukuoka City and its suburbs (iv–xi, H. Kamiya, etc.); Kurume City (vi, H. Kamiya); Mt. Kôrasan (ix, Y. Miyatake).
Kumamoto Pref.: Kumamoto City (viii, N. Tamura).
Ôita Pref.: Mt. Sobosan (viii, H. Kamiya).
Nagasaki Pref.: Nagasaki City and its suburbs (ii, iv, vii–ix, H. Kamiya); Is. Takashima (vi, H. Kamiya).
Kagoshima Pref.: Kagoshima City (v, T. Hidaka); Mt. Takakura (viii, T. Imamura); Yamakawa (vi, H. Kamiya); Cape Sata (v, vi, viii, x, H. Kamiya, etc.).

Scymnus (*Pullus*) *ruficeps* (Ohta, 1929)

(Pl. 39–Q; Fig. 1–F, Fig. 2–S, Fig. 5–G)

Pullus ruficeps Ohta, 1929: Ins. Mats. 4 (1/2): 5 (Honshu: Tokyo).
Scymnus (*Pullus*) *ruficeps* Korschefsky, 1931: Junk's Col. Cat. 118: 136.

The present species is a rather rare one and allied to a smaller form of *Scymnus hilaris* but distinguishable from the latter by the structures shown in the key.

Male genitalia: sipho moderately slender; basal three-fourths of sipho roundely curved, semicircular; inner process of siphonal capsule long, outer one distinct but very short; apical part of sipho pointed, waving to outerside with a very short thread-like process. Tegmen wide in ventral aspect. Median piece of tegmen rather wide with a pointed apex; lateral lobes of tegmen distinctly shorter than the median piece, long oval in lateral aspect.

Body length: 2.0–2.2 mm.; width: 1.3–1.4 mm.

Distribution: Japan (Hokkaido, Honshu, Kyushu).

Specimens examined: 4 exs., Ashoro, Tokachi, Hokkaido. 11–22. vi. 1958, Y. Murakami leg.; 2 exs., same locality, 23. v. 1957, M. Takahashi leg.; 1 ex., Mt. Iwayasan, Nagasaki City, Kyushu, 3. viii. 1957, H. Kamiya leg.

Scymnus (*Pullus*) *kawamurai* (Ohta, 1929)

(Pl. 39–L; Fig. 1–E, Fig. 2–Q, Fig. 5–D)

Pullus kawamurai Ohta, 1929: Ins. Mats. 4 (1/2): 8 (Kyushu: Kumamoto).
Scymnus (*Pullus*) *kawamurai* Korschefsky, 1931: Junk's Col. Cat. 118: 129.

The present species is one of the commonest species of the genus in Japan and allied to *Sc. hilaris*, which is also one of the commonest species and *S. sodalis* but distinctly differs from them by the structure of male genitalia.

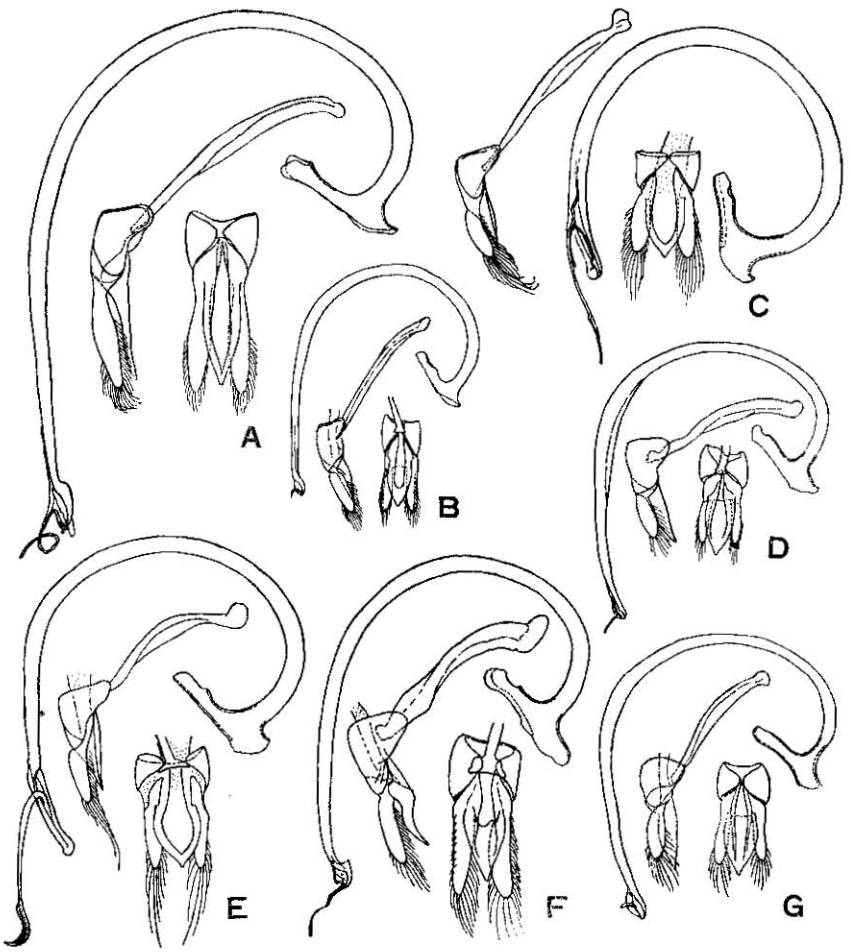

Fig. 5. Male genitalia. A *Scymnus* (*Pullus*) *giganteus* H. Kamiya, sp. nov., B. *Sc.* (*P.*) *sodalis* Weise, C. *Sc.* (*P.*) *ferrugatus japonicus* Weise, D. *Sc.* (*P.*) *kawamurai* Ohta, E. *Sc.* (*P.*) *takabayashii* Ohta, F. *Sc.* (*P.*) *hilaris* Motschulsky, G. *Sc.* (*P.*) *ruficeps* Ohta.

Male genitalia: general characters of male genitalia very closely allied to those of *ruficeps*, but differing in the following characters: Curve of sipho slightly weaker; sipho slightly swollen at the apical one-third; thread-like process of siphonal apex rather longer. Median piece of tegmen slightly slender.

Body length: 2.0–2.4 mm.; width: 1.3–1.7 mm.

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima).

Specimens examined: Many examples from the following localities:

Hokkaido: Engaru (viii, K. Morimoto); Nibushi, Akan (vii, K. Morimoto).

Aomori Pref.: Yunomata (viii, K. Morimoto).

Miyagi Pref.: Sendai (vii, K. Morimoto).

Fukui Pref.: Fukui City (vii, Y. Murakami); Takefu City (vii, Y. Murakami).

Toyama Pref.: Furusato Vill. (x, I, Hiura).

Nagano Pref.: Kuruizawa (viii, H. Kamiya).

Gifu Pref.: Gifu City (viii, I. Bito).

Yamanashi Pref.: Shôsenkyô (vii, H. Kamiya); Masutomi (vii, H. Kamiya); Kôfu City (vii, H. Kamiya).

Tokyo Pref.: Oku-tama (iv, T. Yôrô); Komaba, Tokyo (vi, Y. Tominaga); Setagaya, Tokyo (iv, T. Yôrô).

Kanagawa Pref.: Hakano (v, T. Yôrô); Kamakura (iv, vii, T. Yôrô); Zushi (v, vi, T. Yôrô).

Shiga Pref.: Mt. Ibuki (v, I. Hiura).

Mie Pref.: Tsu City (v, vi, H. Ichihashi).

Osaka Pref.: Minoo (v, K. Morimoto).

Tottori Pref.: Mt. Naki (vii, S. Nakao); Mt. Daisen (v, S. Kimoto).

Kôchi Pref.: Monobe-mura (viii, K. Morimoto); Shimizu (iv, K. Morimoto); Kuroson (iv, Y. Murakami); Jinzenji, Kôchi City (iv, vii, viii, K. Morimoto).

Fukuoka Pref.: Mt. Hikosan (v–viii, H. Kamiya, etc.); Mt. Fukuchi (vii, viii, S. Kimoto); Fukuoka City and its suburbs (iv–x, H. Kamiya, etc.); Tashiro (vi, Y. Miyake); Mt. Kôrasan (ix, Y. Miyatake).

Nagasaki Pref.: Yukinoura (vii, Y. Obuchi); Nagasaki City and its suburbs (vii, viii, H. Kamiya); Is. Takashima (vii, H. Kamiya).

Kumamoto Pref.: Mt. Kimpô (vi, N. Tamura).

Kagoshima Pref.: Yamakawa (v, I. Hiura); Cape Sata (v, vi, viii, H. H. Kamiya, etc.).

Tsushima: Izuhara (v, K. Baba).

Scymnus (*Pullus*) *sodalis* (Weise, 1923)

(Pl. 39–P; Fig. 1–I, Fig. 2–M, Fig. 5–B)

Pullus sodalis Weise, 1923: Archiv Naturgesch. 89 A (2): 186 (Formosa: Kankau, Kosempo).
Scymnus (*Pullus*) *sodalis* Korschefsky, 1931: Junk's Col. Cat. 118: 145.
Scymnus (*Pullus*) *sodalis* Miyatake, 1959: Mem. Ehime Univ. Sect. VI, 4 (2): 134–136, figs. (Amami-Ôshima, Okinawa).

The present species was originally described from Formosa by Weise. M. Miyatake (1959) recorded this from the Loochoos and Nakane and Araki (1959) from the Tokara Islands. Miyatake described the genital characters of both sexes of the present species. This species is distinguishable from the other allied species of Japan and the Loochoos by the characters shown in the key.

Body length: 2.0 mm.; width: 1.4 mm.

Distribution: The Loochoos (Tokara, Amami-Ôshima, Okinawa), Formosa.

Specimens examined: 1 ex., Nishinakama, Amami-Ôshima, 13. ix. 1958, T. Hidaka leg.; 1 ex., Ohgachi, Amami-Ôshima, 14. ix. 1958, T. Hidaka leg.; 8 exs., Nase, Amami-Ôshima, 17. ix. 1958, T. Hidaka leg.; 2 exs., Chinen, Okinawa, 6. xi. 1960, K. Yasumatsu leg.; 3 exs., Yona, Okinawa, 13. xi. 1960, K. Yasumatsu leg.

Feeding habit of each species

Stethorus japonicus H. Kamiya is voraciously feeding on many species of mites, *Tetranychus* (s. lat.) spp., etc., on the citrus trees and other various plants. The author (1959) recorded *Prontaspis yanonensis* Kuwana (not only immature stages and males but also mature females), *Pseudaulacaspis pentagona* Targioni, *Aulacaspis difficilus* Cockerell and *Ceroplastes rubens* Maskell as the prey of this species in the field. In the laboratory, adults of this species feed upon aphids, Coccids, Diaspines and mites.

Scymnus (*Nephus*) *phosphorus* Lewis is a very dominant species, feeding on *Phenacoccus pergandei* Cockerell. The female oviposits her eggs in the egg mass of the scale and hatched larva lives in the egg mass of the scale, feeding the eggs of the prey until pupation. The adult feeds on the nymphs, the eggs of the prey and sometimes attacks the mature females. Tachikawa (1958) recorded the following insects as prey: *Crisiococcus* on *Viburnum awapucki* Koch, *Phenacoccus azaleae* Kuwana, *Ph. pergandei* Cockerell, *Ph. viburni* Kanda, *Phenacoccus* on *Alnus tinctoria* Sargent and *Zelkowa serrata* Makino, *Phanococcus*

kraunhiae Kuwana, *Pseudococcus citriculas* Green, *Pseudococcus comstocki* Kuwana and *Pulvinaria* sp.

Scymnus (*Nephus*) *patagiatus* Lewis may be an aphid feeder.

Scymnus (*Scymnus*) *sylvaticus* Lewis: the larvae of the present species were once found in the gall of *Asteropterix stryacophila* (Korsch) (Aphididae) and once in the gall of aphids on cherry leaves. In the laboratory, the adults of this species were seen actively feeding on aphids.

Scymnus (*Scymnus*) *hareja* Lewis: The author observed that the adults and larvae of this species were feeding on *Prontaspis yanonensis* Kuwana, *Pseudaulacaspis pentagona* Targioni, and *Aulacaspis difficilus* Cockerell. Tachikawa (1958) recorded the other scale insects, *Aspidiotus cryptomeriae* Kuwana and *Pulvinaria aurantii* Cockerell as the prey of this species.

The adults of *Scymnus* (*Pullus*) *hilaris* Motschulsky are usually feeding on aphids found on various plants including the citrus trees. It was observed by Y. Miyatake that the species was once feeding on *Trioza cinnamomi* Bosselli (Psyllidae).

The author often observed that the adults of *Scymnus* (*Pullus*) *dorcatomoides* Weise were feeding on mealybugs of the citrus trees.

The adults of *Scymnus* (*Pullus*) *ferrugatus japonicus*, *Sc.* (*Pullus*) *kawamurai*, were observed feeding on many species of aphids on various trees including the citrus trees.

The adults and larvae of *Scymnus* (*Pullus*) *hoffmanni* were feeding on various species of aphids on *Chrysanthemum*, *Artemisia*, *Persicaria* and *Astragalus* and other *Papilionaceae*-grasses, etc.

The adults of *Scymnus* (*Pullus*) *fuscatus* were often collected together with aphids on *Artemisia*.

The adult of *Scymnus* (*Pullus*) *otohime* was once collected together with many numbers of aphids on *Quercus acutissima* Carruthers. The author collected the following species in the citrus groves in the suburbs of Fukuoka City: *Stethorus japonicus*, *Scymnus* (*Nephus*) *phosphorus*, *Scymnus* (*Nephus*) *patagiatus*, *Scymnus* (*Scymnus*) *pilicrepus*, *Scymnus* (*Scymnus*) *hareja*, *Scymnus* (*Pullus*) *ferrugatus japonicus*, *Scymnus* (*Pullus*) *hilaris*, *Scymnus* (*Pullus*) *kawamurai*, *Scymnus* (*Pullus*) *rectus*, *Scymnus* (*Pullus*) *dorcatomoides*, *Scymnus* (*Pullus*) *fuscatus*, *Scymnus* (*Pullus*) *hoffmanni*, *Scymnus* (*Pullus*) *otohime*. They may be regarded as the predators of the scale insects, aphids or other homopterous insects or mites found upon the citrus trees or grasses under the trees.

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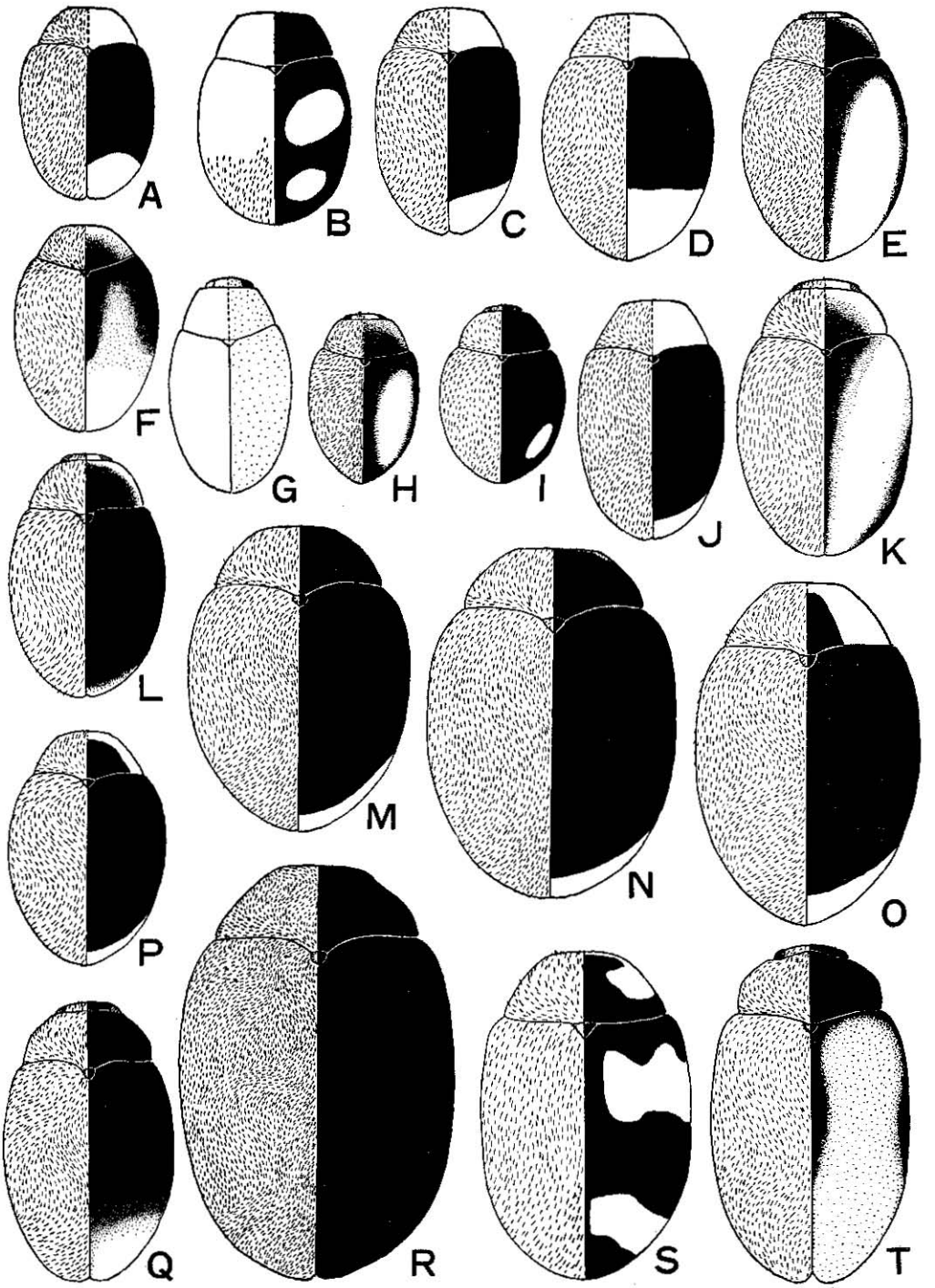
Explanation of Plate 39

Dorsal surfaces of the subgenus *Pullus* of the genus *Scymnus*, left sides showing the direction of hairs, right sides showing the coloration. Each figure is drawn by the same magnifying scale.

A. *Scymnus (Pullus) rectus* Ohta.
B. *Sc. (P.) sapporensis* Ohta.
C. *Sc. (P.) miyatakei* H. Kamiya, sp. nov.
D. *Sc. (P.) contemptus* Weise.
E. *Sc. (P.) hoffmanni* Weise.
F. *Sc. (P.) convexus* H. Kamiya, sp. nov.
G. *Sc. (P.) takaraensis* Nakane et Araki.
H. *Sc. (P.) kaguyahime* H. Kamiya, sp. nov.
I. *Sc. (P.) otohime* H. Kamiya, sp. nov.
J. *Sc. (P.) dorcatomoides* Weise.
K. *Sc. (P.) fuscatus* Boheman.
L. *Sc. (P.) kawamurai* Ohta.
M. *Sc. (P.) hilaris* Motschulsky.
N. *Sc. (P.) takabayashii* Ohta.
O. *Sc. (P.) ferrugatus japonicus* Weise.
P. *Sc. (P.) sodalis* Weise.
Q. *Sc. (P.) ruficeps* Ohta.
R. *Sc. (P.) giganteus* H. Kamiya, sp. nov.
S. *Sc. (P.) fortunatus* Lewis.
T. *Sc. (P.) yamato* H. Kamiya, sp. nov.



Scymnini from Japan and the Loochoos