Kontyû, Tokyo, **43**(4): 422–436. December 25, 1975

A Review of the *approximatus*-Group of *Cryptocephalus* (Coleoptera, Chrysomelidae) in Japan, with Description of a New Species

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Synopsis The *approximatus*-group of *Cryptocephalus* in Japan is reviewed. As the result the group is shown comprising 4 closely allied species, *approximatus* BALY, *fortunatus* BALY, *nitidulus* FABRICIUS and one new species, *aeneoblitus*, instead of 1 to 3 species as hitherto treated by authors. Morphological characters and biological or distributional data of these species are presented.

Introduction

Cryptocephalus approximatus and *fortunatus* have been treated differently by authors concerning their specific status owing to the great variability of the former in coloration and elytral sculpture. KIMOTO (1967) treated the latter as a synonym of the former, while OHNO (1972) regarded them as two distinct species. In addition, *C. nitidulus* FABRICIUS, which is very closely related to *approximatus*, was reported by KOMIYA (1964) from Hokkaido. In the course of the present investigation another species, which has been confused with *approximatus*, was discovered and will be described as new to science. Having examined a number of specimens including the type materials preserved in the British Museum (Nat. Hist.), I have concluded that *fortunatus* BALY is a full species. Morphological characteristics of these 4 species will be given in the following pages, with notes on their food plants and on their distribution.

Cryptocephalus approximatus BALY, 1873

Trans. ent. Soc. Lond., **1873**: 93 [Japan: Nagasaki; syntypes in British Museum (Nat. Hist.)]. —— KIMOTO, 1964 (in part), J. Fac. Agr., Kyushu Univ., **13**: 148 [E. Siberia, N. China, Manchuria, Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu)].

Male. Variable in coloration, green, blue or violaceous in various shades, always with strong metallic lustre; pronotum sometimes yellowish white on corners; gena, trochanter, coxa and extreme base of femur yellowish white; mouth-parts, palpus and frons in part brownish; antenna with 2nd to 4th segments reddish brown; femur largely blackish blue, with metallic lustre; tibia and tarsus with brownish tinge especially on foreleg.

Antenna nearly as long as body; pronotum strongly shining, very finely and sparsely punctate on dorsum. Elytron densely and irregularly covered with punc-

tures, the punctuation becoming finer and sparser apically. Pygidium gently curved downward at apical third, rather trapezoidally produced at apex, with margin thinly trimmed, the produced area shining and sparsely punctate (Fig. 3); lateral lobe shagreened, without groove or linear depression. Fifth visible sternite broadly produced downward at median portion, with a small lip-like projection at apex. Aedeagus with a strongly chitinized bifurcate armature on internal sac (Figs. 1 & 2).

Length: 3.5–4.5 mm.

Female. Clypeus medially stained with dark metallic blue. Antenna about 0.7 times as long as body; elytron irregularly and rugosely punctate on middle portion especially behind humerus; interstices smooth and shining on basal and apical areas, sometimes punctures of elytron extremely fine and sparse, arranged in irregular rows. Pygidium strongly curved downward at apical third, somewhat trapezoid in outlines (Fig. 3), smooth and sparsely punctate on apical third; 5th visible sternite with a deep fovea at middle.

Length: 4.0–5.0 mm.

Distribution. Japan (Honshu, Shikoku, Kyushu).

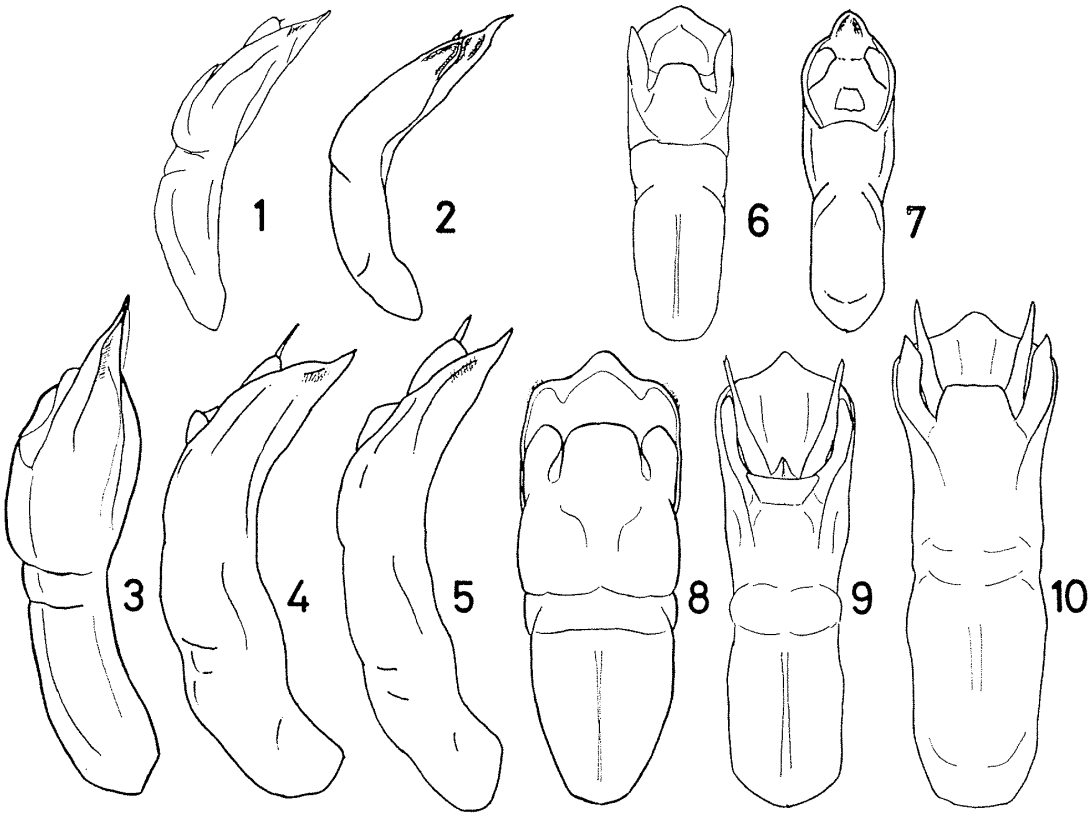

Fig. 1. Aedeagus (dorsal & lateral views) of: 1 & 6, *nitidulus* (from Sapporo, Hokkaido); 2 & 7, *nitidus* (from Guntar Tal, Helvetia); 3 & 8, *aeneoblitus* (from Daibosatsu-tôge, Yamanashi); 4 & 9, *approximatus* (from Kujû-san, Ôita); 5 & 10, *fortunatus* (from Shirakaba-ko, Nagano).

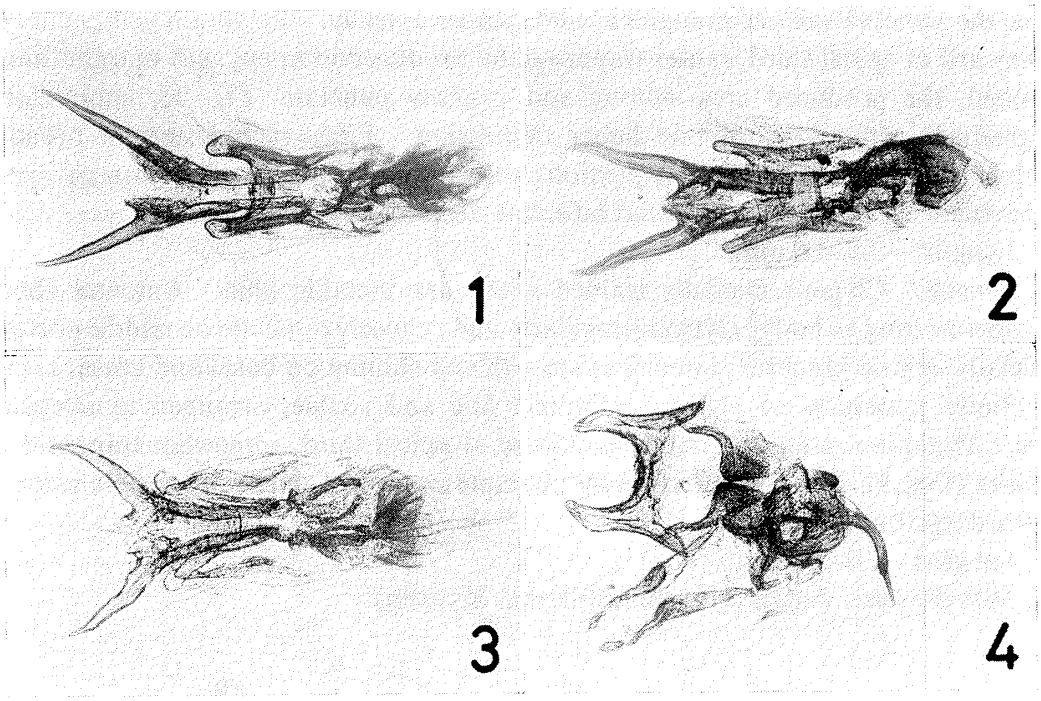

Fig. 2. Aedeagus (internal sac) of: 1, *approximatus*; 2, *fortunatus*; 3, *nitidulus*; 4, *aeneoblitus*.

Note. The type-series in the British Museum (Nat. Hist.) consists of 8 syntypes, of which 6 were examined. This species is one of the commonest leaf-beetles in Japan and widely distributed in Honshu, Shikoku, and Kyushu, mainly on lowlands. KIMOTO recorded this species from N. China, Manchuria, Korea, E. Siberia and Japan (Hokkaido, Honshu, Shikoku, Kyushu). The occurrence of this species outside Japan, however, would require verification. At least records of this species from Hokkaido by authors, and from S. Kuriles and S. Sakhalin by myself should be corrected to *nitidulus* FABRICIUS. Further, the records of *approximatus* by KIMOTO include *fortunatus*, which is here regarded as a distinct species. In my opinion *approximatus* should be restricted to Japan (Honshu, Sikoku, Kyushu) and is found in fields from early spring to late summer, feeding on a wide range of food plants.

Cryptocephalus fortunatus BALY, 1873

Trans. ent. Soc. Lond., **1873**: 94 [Japan ("Hiogo"), Korea (Chusan)]. —— GRESSITT & KIMOTO, 1961, Pacif. Ins. Mon., **1A**: 123, 138 [Japan, Korea, NE. China]. —— KIMOTO, 1964, J. Fac. Agr., Kyushu Univ., **13**: 148 [synonymized with *approximatus* BALY].

Male. Metallic green, sometimes tinged with blue or dark blue, with metallic lustre; head largely yellowish white below antennal sockets, with an X-shaped patch on frons; antenna with 4 basal segments more or less yellowish white; pronotum margined with yellowish white laterally or both laterally and anteriorly; proepimeron

and prosternite generally yellowish white; legs variable in coloration, yellowish brown to dark brown with metallic lustre, fore- and middle femora always largely yellowish brown; epipleuron yellowish white or tinged basally with red-brownish lustre, sometimes concolorous with elytra.

Antenna about 0.7 times as long as body. Pronotum smooth and shining, very finely punctate, lateral reflexed area rather wide; elytra somewhat rugosely punctate on middle portion; pygidium convex, curved downward near apical third, produced rather trapezoidally at apical margin, and thinly trimmed; the surface densely covered with distinct punctures except for much sparsely punctate apical area; lateral lobe with a weak groove or a linear depression parallel to margin near apex; 5th visible sternite weakly produced downward, with a small weak lip-like projection.

Length: 3.8–4.5 mm.

Female. Sometimes blackish blue or bluish violaceous, with metallic lustre; pronotum margined with yellowish white on lateral margins or sometimes on lateral and anterior margins; legs light reddish brown except that tarsi and hind femora are dark brownish, and that sometimes fore- and middle femora also dark brownish. Antenna about 0.7 times as long as body; elytron rugosely punctate at middle portion. Pygidium convex outwardly, curved downward near apical third, almost wholly covered densely with distinct punctures; lateral lobe linearly depressed at apex in parallel to lateral margin.

Length: 4.8–5.5 mm.

Distribution. Japan (Honshu, Shikoku, Kyushu), Korea.

Note. In the British Museum (Nat. Hist.) are deposited 3 syntypic specimens, of which 2, both from Korea, were examined in addition to many specimens collected in Japan. The distinction of this species from *approximatus* is rather easy in the typical form, which is light metallic green with the pronotum and epipleuron margined, and with the legs light red-brownish. Some specimens, however, closely approach the range of *approximatus* in coloration, yet the characteristics in the pygidium

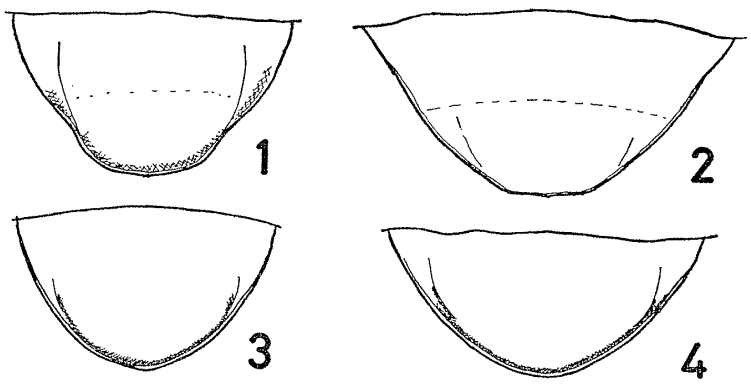

Fig. 3. Pygidium (dorso-posterior view) of: *approximatus* (1, male; 2, female); *aeneoblitus* (3, male; 4, female).

may suffice to distinguish them. The male aedeagi of both the species are closely similar except for some differences in the armatures of the internal sac (Fig. 2). Compared with *approximatus* or *aeneoblitus* sp. nov., this species seems rather locally restricted or less abundant. It is found in fields chiefly in summer on *Corylus, Castanea* and *Quercus*.

Cryptocephalus nitidulus FABRICIUS, 1787

Mant. Ins., **1**: 84, 1787. —— KOMIYA, 1964, Ent. Rev. Japan, **16**: 64 [Japan: Rebun Is].
Cryptocephalus approximatus: KIMOTO, 1965, Kontyû, Tokyo, **33**: 311 [Kuriles]. —— TAKIZAWA, 1971, Kontyû, Tokyo, **38**: 173 [S. Sakhalin], 176 [S. Kuriles].
Cryptocephalus fortunatus borealis L. MEDVEDEV, 1966, Forest. Ent.-Fauna Kuril, Kamch. & Magad. 39 [S. Kuriles].

Male. Light metallic green with or without bluish tinge, sometimes metallic blue with violaceous tinge; head below antennal sockets, and a round or X-shaped patch on frons yellowish white; antenna dark brown except for 3 or 4 basal segments light brown; pronotum margined with yellowish white anteriorly and laterally, sometimes margination becoming obscure; fore- and middle legs light brown, with femora partly dark brown and tarsi darker; hind leg largely dark brown to blackish with coxa light brown.

Antenna about 0.8 times as long as body. Pronotum shining, weakly punctate; elytron covered with deep, large punctures, the punctures becoming finer near apex. Pygidium gently convex outwardly, punctuation dense on basal half; lateral lobe with a linear depression parallel to margin; 5th visible sternite flat, slightly depressed medially, apical margin simple, lacking lip-like projection. Aedeagus small, roundly narrowed to apex into a triangular projection; bifurcate armature on internal sac short and curved inwardly near apex (Figs. 1 & 2).

Length: 3.8–4.8 mm.

Female. Pronotum generally stained with yellowish white only on anterior corners, or narrowly on lateral margins. Antenna about 0.6 times as long as body; pronotum shining, weakly punctate; elytron rugosely punctate on middle portion; pygidium transversely elliptical, thinly trimmed on margin, weakly convex outwardly, covered with dense punctuation, with the interstices shagreened; lateral lobe with a shallow groove or a linear depression.

Length: 4.0–5.3 mm.

Distribution. N. & W. Europe, W. Siberia, S. Sakhalin, S. Kuriles, Japan (Hokkaido).

Note. The description of *fortunatus borealis* L. MEDVEDEV, which was erroneously synonymized with *approximatus* BALY by myself, agrees quite well with the present species. I have compared the present specimens from Sakhalin, Kuriles and Japan with those from middle Europe, and found no distinctive difference. I prefer to regard *borealis* as a synonym of *nitidulus*. This species occurs in rather small numbers in Hokkaido from June to August. I observed it feeding on *Polygo-*

num sp. near Sapporo. KOMIYA reported *Betula ermanii* as a host of this species on Rebun Is.

Cryptocephalus aeneoblitus sp. nov.

Male. Body elongate, subparallel-sided, steel blue with metallic lustre, sometimes with a weak greenish tinge; head below antennal sockets including mouthparts yellowish red; apices of mandibles and palpi darker; antenna blackish with 4 basal segments more or less yellowish brown; middle and hind legs blackish with metallic reflections on femora, with coxae, trochanters, and basal extremities of femora yellowish brown; foreleg yellowish brown except that femur apically, and tibia dorsally are stained with dark metallic blue and tarsi are darker; sometimes head with a yellowish brown patch between eyes, and pronotum narrowly margined laterally with same color.

Head densely punctate except on median portion of vertex depressed longitudinally; antenna about 0.8 times as long as body, densely pubescent on 5th and following segments; relative length of segments as follows: $11 \fallingdotseq 10 > 9 \fallingdotseq 8 \fallingdotseq 7 > 6 > 5 > 4 > 1 > 3 \gg 2$; 1st segment clavate; 2nd conical, 0.5 times as long as 3rd; 11th longest, pointed apically. Pronotum evenly convex above, almost straight anteriorly, gently produced posteriorly, and roundly narrowed at well-reflexed lateral margins; anterior corner obtusely acute, somewhat produced, the posterior nearly rectangular; dorsal surface shining, scattered with rather weak longitudinal punctures. Scutellum trapezoid, impressed with minute punctures. Elytron about 2.1 times as long as broad, irregularly covered with large punctures, transversely wrinkled behind humerus, the interstices smooth and shining; punctures finer near apex; side narrowly reflexed except for apex. Epipleuron broadest at basal third, thence suddenly narrowed and tapering out near apical fourth, the surface concave and shining, with one or two irregular rows of punctures along with inner margin. Pygidium hemi-circular, weakly reflexed outwardly at lateral margin, wholly covered with setae and punctures, interstices shagreened (Fig. 3); lateral lobe with a deep groove parallel to margin. Last visible abdominal sternite rather flat, with an oblong depression at middle. Aedeagus rather robust, lacking bifurcate armature on internal sac (Figs. 1 & 2).

Length: 4.0–5.0 mm.

Female. Coloration as in male, with antenna and legs generally darker; antenna about 0.6–0.7 times as long as body; elytron about 2.7 times as long as wide, with interstices largely shagreened behind humerus; pygidium shagreened, wholly covered with setae and punctures (Fig. 3).

Length: 5.0–6.0 mm.

Distribution. Japan (Honshu, Shikoku, Kyushu).

Type-series. 6 ♀♀ (one the holotype, preserved in the Entomological Institute, Hokkaido Univ.), 4 ♂♂, Mt. Kujû-san, Ôita, 13–15. V. 1967, H. TAKIZAWA leg.;

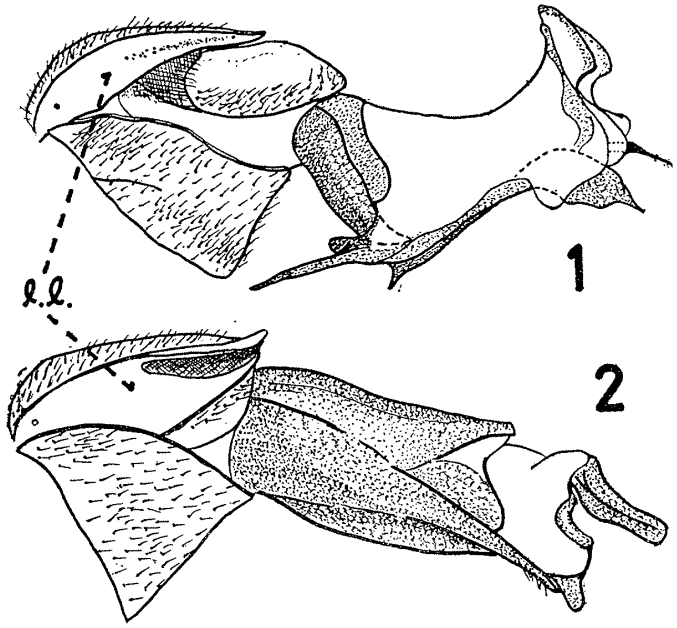

Fig. 4. Aedeagus showing evaginated internal sac of: 1, *approximatus*; 2, *aeneoblitus* (l. l.: lateral lobe).

1 ♂ 2 ♀♀, Mt Tsurugi-san, Ehime, 14–15. VII. 1971, M. SUWA leg.; 4 ♂♂ 8 ♀♀, Shirakaba-ko, Nagano, 21–22. VII. 1974, H. TAKIZAWA leg. (1 ♂ 1 ♀, preserved in the British Museum (Nat. Hist.)); 6 ♂♂ 4 ♀♀, Jimba-san, Tokyo, 14. V. 1969, H. TAKIZAWA leg.

Specimens from the following localities are also examined:— *Kagoshima*: Kurino, Yunono, Takachiho & Kirishima in Mt. Kirishima; Kagoshima; Mt. Osuzu-yama. *Miyazaki*: Mt. Sobo-san. *Ôita*: Mt. Yufu-dake. *Fukuoka*: Mt. Hiko-san. *Kôchi*: Mitsune; Mt. Kamegamori. *Tokushima*: Koyadaira. *Ehime*: Mt. Ishizuchi-yama; Sanoyama. *Hyôgo*: Mt. Rokkô-san. *Wakayama*: Wakayama. *Mie*: Mt. Gozaisho-dake. *Nara*: Mt. Ôdaigahara-san; Nara. *Gifu*: Gifu. *Shizuoka*: Mt. Amagi-san; Inatori; Mt. Chausu-dake. *Nagano*: Mt. Utsukushigahara; Mt. Yatsugatake; Kirigamine. *Yamanashi*: Gotemba; Koike; Mt. Daibosatsu; Mt. Senjô-dake; Masutomi; Mt. Hôô-san; Mt. Ôgi-yama; Yamanashi. *Kanagawa*: Hatano; Aobadai; Sekirô-yama; Mt. Nabewari-yama. *Tokyo*: Takao-san; Mitake; Kiyose; Nippara; Hachiôji. *Saitama*: Hannô; Tokorozawa. *Gumma*: Mt. Tairappyô. *Tochigi*: Chûzenji; Nikkô; Shiobara. *Miyagi*: Shirafu-takayu.

Note. This new species is closely related to *approximatus* BALY, *fortunatus* BALY, *nitidulus* FABRICIUS and *nitidus* (LINNÉ) in appearance; however, as shown in the key, it is clearly distinguished from these species by the shape of the pygidium, and also of the last visible abdominal sternite. There is one female specimen from Manchuria in the collection of the Entomological Institute, Hokkaido Univ., very closely resembling the present new species. It differs from the latter by lighter col-

oration of the appendages and by the distinctly punctate pronotum. Since I have seen no male specimens from Manchuria, I refrain from referring the female specimen to this species. This species is common, living with *approximatus* side by side in many places and feeds on a wide range of hosts from April to August.

Key to the Mentioned Species

1. Pygidium hemi-circular in outline, wholly covered with punctures and pubescence, in lateral view almost flat or weakly convex dorso-posteriorly (Fig. 3). 2
— Pygidium produced in somewhat trapezoid shape on posterior margin, in lateral view curved downward near apical third, especially in female (Fig. 3)..... 4
2. Dark steel blue with metallic lustre; pygidium with a sharp and deep groove on lateral lobe parallel to margin; male with a large, shallow depression on middle of last visible abdominal sternite; aedeagus as shown in Figs. 1, 2 & 4. .... *aeneoblitus* sp. nov.
— Pygidium lacking distinct groove, or with a rudimentary shallow and short linear depression on lateral lobe..... 3
3. Light green or blue with greenish tinge, with strong metallic lustre; pronotum usually margined with yellowish brown on lateral and anterior margins; head always with a distinct yellowish bifurcate patch on frons; pygidium with rudimentary shallow linear depression on lateral lobe; male without depression on middle of last visible abdominal sternite; aedeagus as shown in Figs. 1 & 2. ..... *nitidulus* FABRICIUS
— Dark blue with metallic lustre; head below antennal sockets yellowish white, with a pair of small yellowish patches interiorly to eyes; male with foreleg and female with all legs light yellowish brown; pygidium without groove on lateral lobe; male with a large transversely oval depression on middle of last visible sternite; aedeagus as shown in Fig. 1. ..... *nitidus* (LINNÉ) (Europe)
4. Light greenish, sometimes violet or dark blue, with strong metallic lustre; pronotum usually margined with yellowish white on lateral and anterior margins; legs largely reddish brown with hind femora sometimes darkened, in case of most darkened specimens fore femur tinged only slightly with dark metallic blue; epipleuron variable in coloration, with its exterior portion largely yellowish white, or stained with red-brownish tinge, and sometimes almost concolorous with elytra; pygidium with a linear depression on apical extremity of lateral lobe; aedeagus as shown in Figs. 1 & 2. ..... *fortunatus* BALY
— Color variable, green, blue or violaceous, with metallic lustre; pronotum sometimes yellowish white on corners; legs dark with metallic lustre, fore leg with apex of femur dark metallic blue; pygidium lacking groove, sometimes with a linear depression on lateral lobe; aedeagus as shown in Figs. 1, 2 & 4. .... *approximatus* BALY

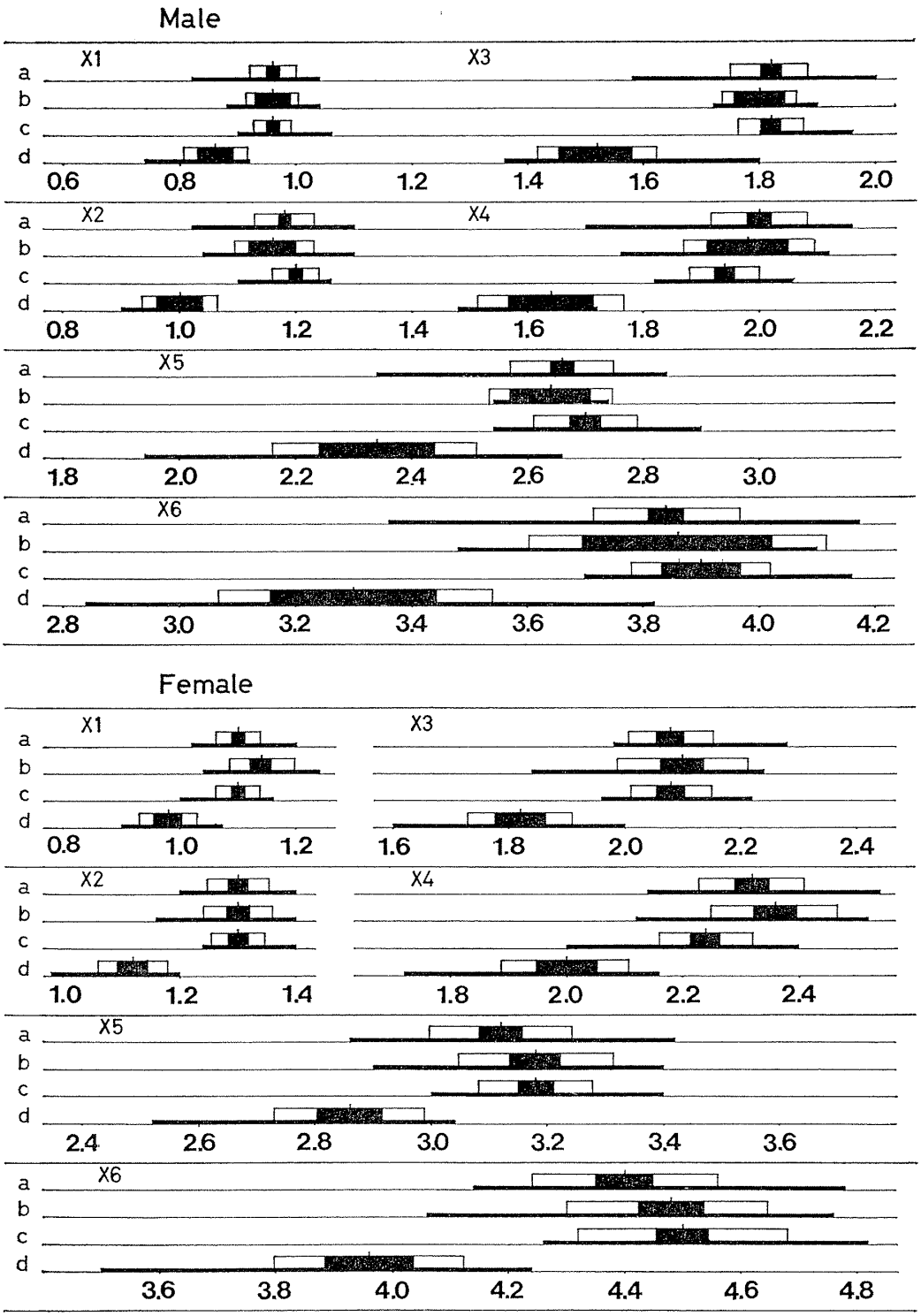

Fig. 5. Measurements of X1–X6 in Japanese *approximatus* group. Heavy horizontal line: range; black bar: twice standard errors of mean ($2\sigma_M$) on either side of mean; white bars plus black bar: twice standard deviations (2σ); small dot: mean.

Numbers of measured specimens: *approximatus* (a), 68 ♂♂ 42 ♀♀ from Aobadai; *fortunatus* (b), 14 ♂♂ 40 ♀♀ from Honshu, Shikoku & Kyushu; *aeneoblitus* (c), 49 ♂♂ 43 ♀♀ from Kirigamine; *nitidulus* (d), 12 ♂♂ 19 ♀♀ from Hokkaido & Kurile Is.

Statistical Comparisons

As shown in the preceding key, these 4 species are distinguishable on the basis of diagnostic characters. In order to give support to the above conclusions, statistical comparisons between species were attempted. Measurements for comparisons were taken of the following parts of the body with a unit of 1/5 mm: apical width of prothorax (X1); length of prothorax (X2); basal width of prothorax (X3); body width between elytral humeri (X4); length of elytron (X5); body length (X6=X2+X5). The mean value and the standard deviation were calculated for each character (Fig. 5). Further, for *aeneoblitus*, *approximatus* and *fortunatus*, correlation coefficients between 2 characters (X4, X5) were calculated, and linear equations, X4=aX5+b, were set up by the method of least squares.

Results of comparisons are shown in Figs. 5–7. There are significant differences (99% level) in the mean values of all the characters between sexes and between *nitidulus* and the other 3 species. Between *approximatus*, *aeneoblitus* and *fortunatus*, the difference in each character are slight, yet some are significant (Fig. 5). Body length (X6) in *aeneoblitus* is slightly yet significantly (at 95% level in male, 99% level in female) longer than in *approximatus*, and the tendency is almost always exhibited between local populations of these species (Fig. 6). On the other hand, the elytra of *aeneoblitus* are obviously narrow in comparison with *approximatus* and

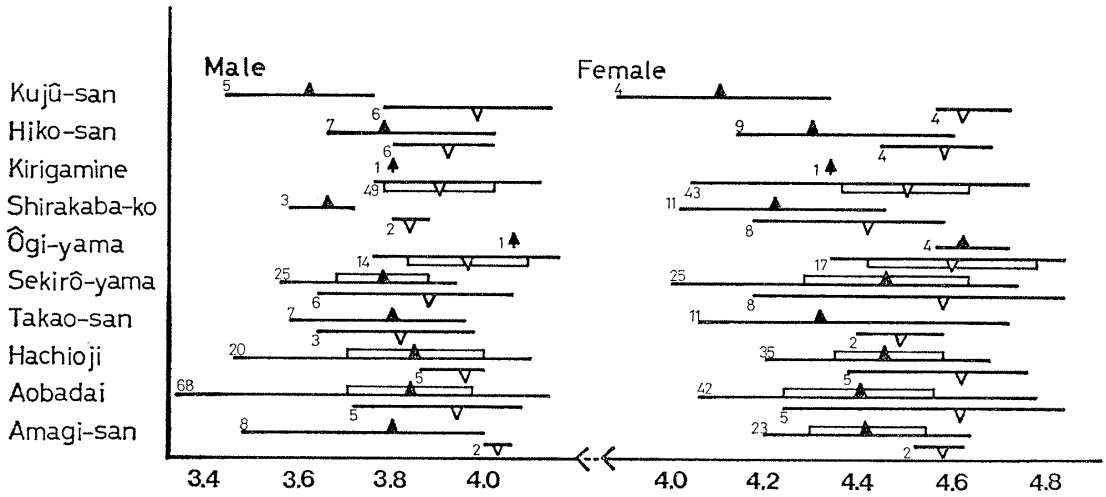

Fig. 6. Local variations in body length (X6) in *approximatus* and *aeneoblitus*.

Black bar: range; white bar: twice standard deviations; triangle: mean (white for *approximatus*; black for *aeneoblitus*); numerals at left end of each bar: no. of measured specimens.

Locality: Kyushu — Kujû-san, ca. 1,000–1,300 m alt. (no. 1 of Fig. 8) (13–15. V. 1967); Hiko-san, ca. 1,000 m (no. 2) (17–19. V. 1967). Honshu — Kirigamine, ca. 1,400–1,600 m (no. 3) (1–2. VII. 1974); Shirakaba-ko, ca. 1,400 m (no. 5) (27. V. 1974); Sekirô-yama, ca. 500–600 m (no. 6) (13. V. 1973); Takao-san, ca. 400–600 m (no. 7) (V. 1966, 1967, 1969); Hachiôji, ca. 100–200 m (no. 8) (20. V. 1973); Amagi-san, ca. 600–900 m (no. 10) (16–17. V. 1966).

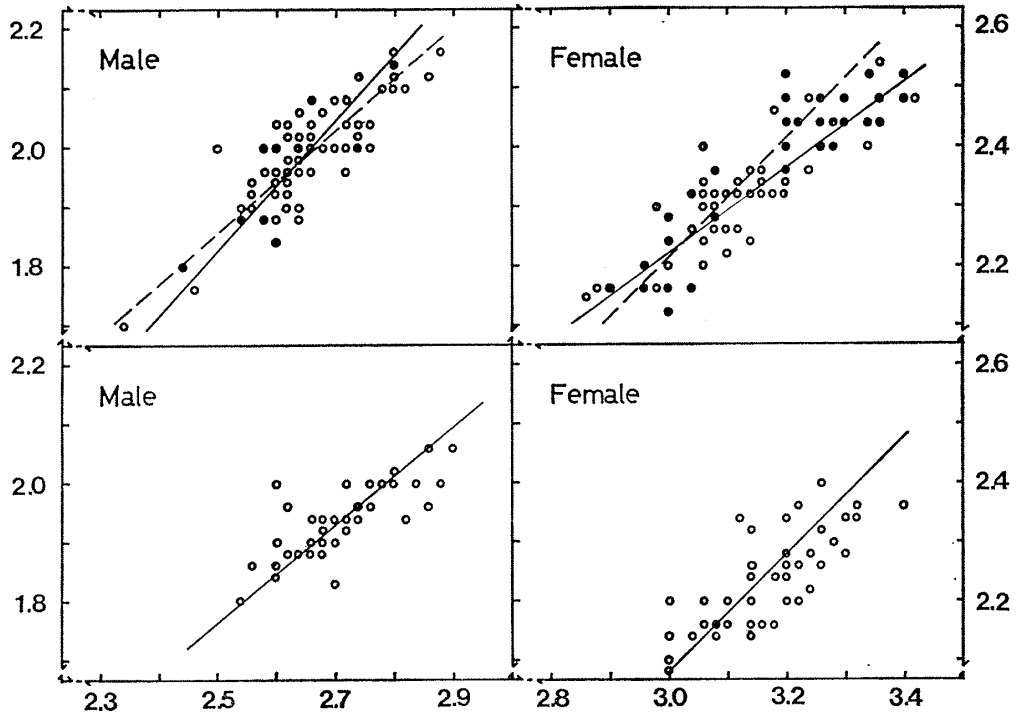

Fig. 7. Scattered diagrams of body width (X4) and elytral length (X5). Ordinate: X4 (body width); abscissa: X5 (elytral length). Upper diagrams — *approximatus* (open circle): male (n=68), Y=0.913X+4.189 (γ=0.841), female (n=42), Y=0.758X−0.220 (γ=0.863); *fortunatus* (closed circle): male (n=14), Y=0.850X−1.328 (γ=0.790), female (n=40), Y=1.024X+3.748 (γ=0.827). Lower diagrams — *aeneoblitus*: male (n=49), Y=1.120X +2.750 (γ=0.827), female (n=43), Y=0.930X+5.450 (γ=0.773). Specimens as in legend of Fig. 4.

fortunatus (Fig. 7). Thus there are distinct differences between *nitidulus* and the other 3 species, and slight differences between *aeneoblitus* and *fortunatus* or *approximatus*. So far as the present materials are concerned, the differences between *fortunatus* and *approximatus* are quite slight.

Distributions

The geographical distributions of these species are summarized in Fig. 8 and Table 1. Although sufficient data are only available for the Kantô and Chûbu districts (middle parts of Honshu Is.), it is clearly shown that *approximatus*, *aeneoblitus* and *fortunatus* are distributed and widely overlapped on the islands Kyushu, Shikoku and Honshu, while *nitidulus* exclusively occupies northern islands, Hokkaido, S. Kuriles and S. Sakhalin. Thus, *approximatus* and *aeneoblitus* were found together at 33 localities out of 72 or 56 localities for respective species. Among the 72 or 56 localities, 23 for *approximatus* and 10 for *aeneoblitus* were represented by a single specimen of each species. Excluding these single-specimen localities from con-

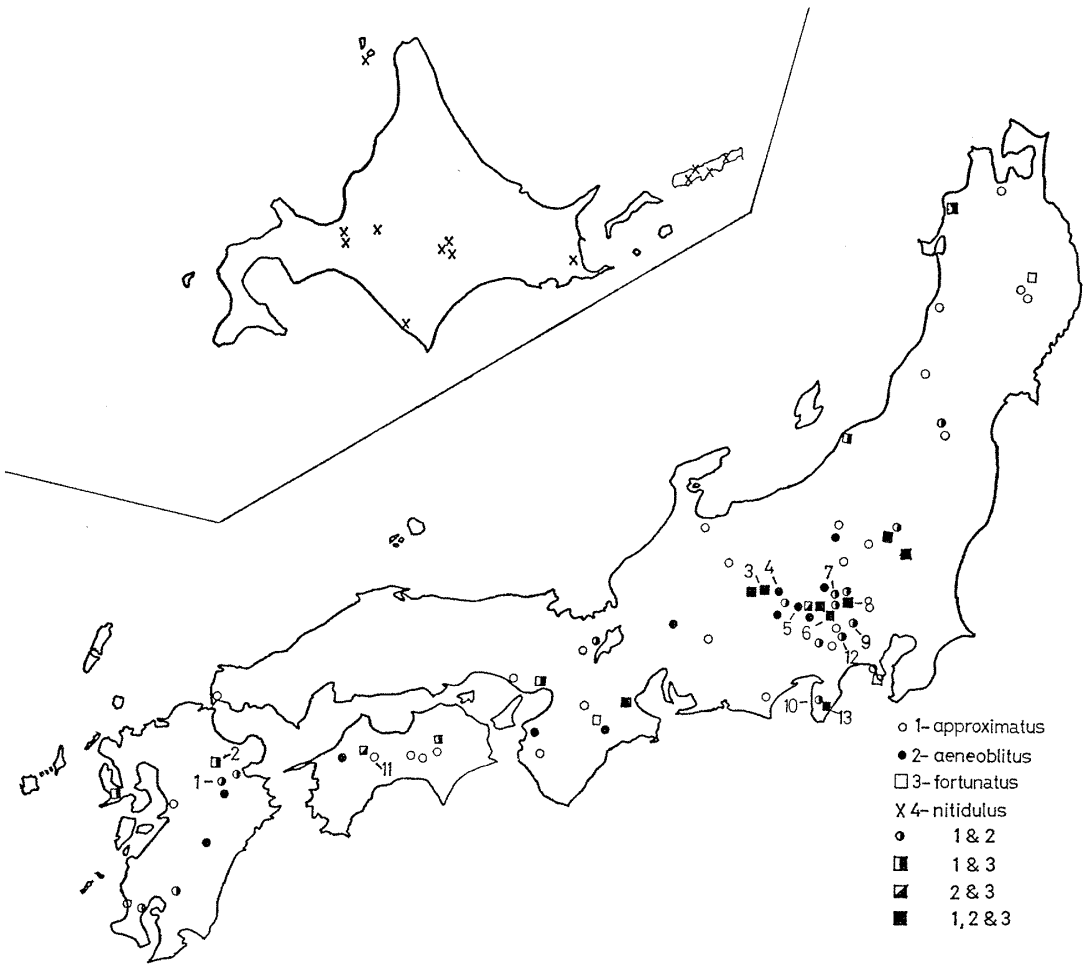

Fig. 8. Distribution of *approximatus* group in Japan.

Table 1. Number of localities where two or three species were found together.

No. of localities / Species	Total	*approximatus* & *fortunatus*	*approximatus* & *aeneoblitus*	*fortunatus* & *aeneoblitus*	*approximatus*, *fortunatus* & *aeneoblitus*
approximatus	72	2	22	—	11
fortunatus	20	2	—	4	11
aeneoblitus	56	—	22	4	11
nitidulus	15	—	—	—	—

sideration, co-existence seems fairly common between the two species throughout their ranges, at 33 localities out of 49 or 46 for respective species. It is very hard with these limited data to say something conclusively about geographical tendencies in the occurrence and abundance of each species, but I think that *aeneoblitus* is rather limited to uplands.

Biological Observation

Field observations on food plants of the *approximatus* group are summarized in Table 2. Besides the listed plants, *Populus maximowiczii* HENRY (Salicaceae), *Malus pumila* MILL. (Rosaceae), and *Alnus hirsuta* ZUCC. (Betulaceae) were listed as food plants of the *approximatus*-group by authors. As seen from the table, the

Table 2. Food plants of *approximatus* group.

Food plants	*approximatus*	*aeneoblitus*	*fortunatus*	*nitidulus*
Salicaceae				
Salix sp.		+(c)		
Betulaceae				
Betula platyphylla SUKATCHEV		+(c)		
Betula ermanii CHAM.				+(n)
Betula sp.				+(Europe)
Corylus heterophylla FISCH		+(c)		
Corylus sp.				+(Europe)
Fagaceae				
Castanea crenata SIEB. et ZUCC.	+(e,f,j,l)	+(b, c, l)	+(l)	
Quercus acutissima CARR.	+(b, e, g, j)		+(a)	
Quercus serrata THUMB.	+(b,e,f,g,j)	+(c,e,f,g,j)	+(e, j)	
Rosaceae				
Prunus grayana MAXIM.	+(j)			
Prunus yedoensis MATSUM.	+(g, l)			
Rosa sp.	+(g, h)			
Rubus sp.	+(g)			
Leguminosae				
Lespedeza bicolor TURCZ	+(g, i)	+(f, l)		
Wisteria floribunda (WILLD.)	+(g, i, j)			
Rhamnaceae				
Rhamnus japonica MAXIM.	+(g, l)			
Ericaceae				
Rhododendron kaempferi PLANCH.	+(g, l)	+(f, j, l)		
Verbenaceae				
Callicarpa japonica THUNB.	+(e, g)			
Caprifoliaceae				
Viburnum dilatatum THUNB.		+(g)		
Viburnum sp.		+(h)		
Polygonaceae				
Polygonum cuspidatum SIEB. et ZUCC.	+(d,e,h,i, j,k,l)	+(b)		
Polygonum sachalinense FR. SCHM.				+(m)

Localities: a, Tsushima Is. (after OHNO, 1966); b, Gozaisho-dake (Mie); c, Kirigamine (Nagano); d, Amagi-san, e, Inatori (Shizuoka); f, Ôgi-yama (Yamanashi); g, Aobadai, h, Bodai, i, Hatano, j, Sekirô-yama, k, Zushi (Kanagawa); l, Hachiôji (Tokyo); m, Rebun Is. (after KOMIYA, 1964), n, Sapporo (Hokkaido).

host range is wide, covering 10 plant families. *Castanea*, *Quercus*, *Prunus*, *Lespedeza*, *Wisteria*, *Rhododendron* and *Polygonum* species are most common food sources among the species. The table seemingly implies some tendency of food preference. Some host groups are characteristically utilized by only one of these 4 species, that is Salicaceae by *aeneoblitus*, Rosaceae by *approximatus* etc. A wide host range is, however, not a rare case among the members of the genus *Cryptocephalus*. For instance, *Cryptocephalus japanus* BALY and *C. signaticeps* BALY in Japan feed on almost whole range of host plants in the table. Taking account of such cases, the difference in host preferences between the 4 species may not be so marked in reality as the present data imply.

As the consequence of the broad geographical overlap and the absence of pronounced difference in habitat selection or in food preference, *approximatus*, *aeneoblitus* and *fortunatus* are often found on one and the same food plant in many localities. In spite of this, these species seem to be well isolated in reproduction. The numbers of copulating pairs observed in fields are given in Table 3. Although different species were not necessarily taken from the same host plant at each locality, these data may reflect tendencies in mating behaviour. Among a total of 73 cases, all but two are intraspecific, notwithstanding the presence of other species. These cases of inter-specific copulation were observed on cultivated Japanese chestnut (*Castanea crenata*), either between male *approximatus* and female *fortunatus*. It is beyond doubt that some isolating mechanisms operate among the three species in their sympatric localities. The collection data at hand imply differences or fluctuations in relative abundance of these species in space and time. Spatial isolation seems to exist between *approximatus* and *aeneoblitus*, whereas seasonal isolation may be involved between *approximatus* and *fortunatus*.

Table 3. Number of pairs in copulation observed in fields.

locality	*approximatus*	*aeneoblitus*	*fortunatus*	interspecific
Kujû-san, Ôita (1)	1 (7)	— (7)	— —	—
Hiko-san, Fukuoka (2)	3 (13)	— (9)	— —	—
Mitsune, Kôchi (11)	— —	— (2)	1 (4)	—
Kirigamine, Nagano (3)	— (1)	— (90)	1 (3)	—
Shirakaba-ko, Nagano (4)	— (14)	— (12)	2 (12)	—
Inatori, Shizuoka (13)	18 (128)	2 (6)	— —	—
Aobadai, Kanagawa (9)	17 (111)	2 (7)	— —	—
Hatano, Kanagawa (12)	2 (21)	— (1)	— —	—
Sekirô-yama, Kanagawa (6)	3 (64)	1 (15)	1 (3)	—
Hachiôji, Tokyo (8)	9 (56)	3 (10)	0 (5)	2

Localities 1, 2, 3, 4, 6, 8 and 9, see legend of Fig. 6; locality 11 (17. 18. VI. 1971), 12 (9. V. 1971, 11. V. 1974), 13 (6. V. 1973).

Number in parenthesis: total number of capture on the day.

Acknowledgments

I wish to express my hearty thanks to Dr. R. T. THOMPSON of the British Museum (Nat. Hist.), Dr. T. KUMATA of Hokkaido Univ., and to Dr. K. KUSIGEMATI of Kagoshima Univ., for the loan of materials. My thanks are also due to Dr. K. SUZUKI of Toyama Univ., and to Dr. S. TAKAGI of Hokkaido Univ., for valuable advice and reading through the manuscript.

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