

The Genus *Rhopalum* Kirby (1829) of Japan, Korea, Saghalien
and the Kuriles, with a Suggested Reclassification
of the Subgenera and Descriptions of Four New
Species (Hym. Sphecidae, Crabroninae)

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**The Genus *Rhopalum* Kirby (1829) of Japan, Korea, Saghalien
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(With 79 Text-figures)

Nowadays the genus *Rhopalum* seems to be admitted by the experts of the Crabroninae as comprising two subgenera, namely *Rhopalum* s. str. and *Corynopus* Lepeletier et Brullé, upon the basis of the characters of the antennae, legs (♂) and pygidial area (♀). According to the comparative study of the male genitalia, however, this genus seems to be divisible more naturally into the three subgenera written below.

The writer expresses his cordial thanks to Professor Tohru Uchida for his valuable criticism rendered during the present study. He also acknowledges his indebtedness to Professor Toichi Uchida and Professor Chihisa Watanabe of the Entomological Institute of Hokkaido University and to Dr. Satoru Kuwayama of the Hokkaido Agricultural Experiment Station for their kind help in placing at his disposal the valuable specimens which they collected in Saghalien and the Kuriles. Finally his sincere thanks are due to Dr. J. Leclercq of l'Université de Liège, without whose kind help the comparative studies on some species dealt with in the present treatise could not be carried out.

Key to Subgenera

1. Cardo of male genitalia Y-shaped in the dorsal view (Figs. 62, 63). (External distinctions: Head and thorax half-opaque, frontal impressions distinctly outlined, petiole of abdomen longer than hind trochanter and femur combined (♂♀); pygidial area

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with medial longitudinal carina at base (♀).

Latrorhopalum subgen. nov.

(Type: *R. latronum* Kohl, 1915)

- Cardo of male genitalia cylindrical in the dorsal view (Figs. 64-66, 68, 70, 71). (External characters: Head and thorax shining, frontal impressions not well-defined, petiole of abdomen shorter than hind trochanter and femur combined (♂ ♀); pygidial area with or without median carina (♀) 2
2. Squamae only slightly longer than sagitta (Figs. 68, 70, 71). (External distinctions: Petiole with its maximum breadth just in front of its apex (♂ ♀); pygidial area with medial longitudinal carina (♀).

Calceorhopalum subgen. nov.

(Type: *R. calceatum* Tsuneki, 1947)

- Squamae at least 2.5 times as long as sagitta (Figs. 64-67). (External distinctions: Petiole with its maximum width at some distance from apex (♂ ♀); pygidial area without median longitudinal carina (♀).

Rhopalum Kirby, 1829 3

3. Antennae and front metatarsi remarkably modified (♂); pygidial area shining, triangular in shape, apically excavated (♀).

Section *Corynopus* Lepeletier et Brullé, 1834

- Antennae and front metatarsi nearly simple (♂); Pygidial area dull, elongate-triangle with its apex not produced, not excavated (♀).

Section *Rhopalum* Kirby, 1829 (s. str.)

Key to species

♂ ♂

1. Petiole of abdomen long, as long as hind trochanter and femur combined, head and thorax half-opaque owing to microscopical sculpture, frontal impressions well-defined, clearly outlined, rather large species, 7-8 mm 2
- Petiole of abdomen short, less than as long as hind trochanter and femur taken together, head and thorax not half-opaque, frontal impressions not well-defined, usually small species, 4.5-6.5 mm. 3
2. Antenna: Fig. 35. Clypeus: Fig. 2. [Temples rounded, not ridged on lower border; median longitudinal groove between postocelli feeble; front leg: Fig. 55 mid leg with metatarsus dilated, crooked and very strongly enlarged at apex (Fig. 56); 2nd joint of hind tarsi dilated and bent (Figs. 57, 58); radial cell of forewing: Fig. 59; apical margin of 6th sternite of abdomen distinctly roundly emarginate in middle; genitalia: Fig. 62, squama approximately thrice as long as sagitta; 8th sternite: Fig. 73]— Korea, the Ussuri region and Saghalien.

Rhopalum (Latrorhopalum) laticorne (Tsuneki)

- Antenna: Fig. 34. Clypeus: Fig. 4. [Temples flattened, rather excavated, with lower border ridged; median longitudinal groove between postocelli distinct; front leg: Fig. 52; mid leg with metatarsus crooked but not dilated and less strongly enlarged at apex (Fig. 52); 2nd joint of hind tarsi incrassate, very slightly dilated and bent (Figs. 51 and 54); radial cell of forewing similar to Fig. 59; apical margin of 6th sternite

of abdomen nearly straight; genitalia: Fig. 63, squama nearly 2.5 times as long as sagitta; 8th sternite: Fig. 74]— Japan proper, Shikoku, Hokkaido, Saghalien and the Kurile Islands.

Rhopalum (Latrorhopalum) latronum (Kohl)

3. Radial cell of forewing with apical transverse nervure standing vertically upon radial nervure (similar to Fig. 59); antenna: Fig. 37. [Clypeus: Fig. 7. End of occipital carina produced in a tooth. Front leg: Fig. 50. Petiole of abdomen: Fig. 33, provided with longitudinal carinae on anterior portion. Genitalia: Fig. 66, squama nearly 3.5 times as long as sagitta, volsella pointed at apex; 8th sternite: Fig. 75. Lateral carinae on posterior surface of propodeum present]— Europe, Japan proper, Hokkaido and the Kurile Islands.

Rhopalum (Rhopalum) nigrinum Kiesenwetter

- Radial cell of forewing with apical transverse nervure standing more or less obliquely upon radial nervure (Figs. 60, 61); antenna with another conformation 4
4. Antenna nearly simple, at most 6th joint slightly excavated beneath; front metatarsus normal 5
- Antenna highly modified; front metatarsus abnormal 6
5. Clypeus: Fig. 15; front metatarsus distinctly longer than 3 subsequent joints united. [Antennal joint 6 subequal in length to 4 and 5 combined (Fig. 38); vertex fairly depressed at each ocellus; medial groove on area cordata distinct, narrow; lateral carinae on posterior surface of propodeum definable only at base; posterior swollen portion of abdominal petiole attaining approximately half of the segment (Fig. 29); metatarsus of hind leg only slightly incrassate; genitalia: Fig. 65, squama approximately 2.5 times as long as sagitta, volsella not pointed at apex; 8th sternite: Fig. 76]— Hokkaido, northern parts of Japan proper and the Kurile Islands.

Rhopalum (Rhopalum) jessonicum (Bischoff)

- Clypeus: Fig. 17; front metatarsus subequal in length to 3 subsequent joints combined. [Antennal joint 6 less than as long as combined length of 4 and 5 (Fig. 39); vertex much less depressed at each ocellus than in *jessonicum*; medial groove on area cordata indistinct, lateral carinae on posterior slope of propodeum distinct only at base; posterior swollen portion of abdominal petiole surpassing half of the segment (Fig. 32); hind metatarsus fairly strongly incrassate; genitalia: Fig. 67]— Hokkaido.

Rhopalum (Rhopalum) ebetsuense sp. nov.

6. Antennae: Fig. 36, 3rd joint very small, much less than as long as 4th; an impression on posterior aspect of propodeum distinctly outlined at least on posterior half, lateral carinae present; abdominal petiole with ratio of length to width approximately 5:2, widest at some distance from apex (Fig. 30); mid metatarsus modified (Fig. 46). [Clypeus: Fig. 12. End of occipital carina protruded in a tooth; front leg: Fig. 45. Hind leg: Fig. 47. Radial cell of forewing: Fig. 60. Genitalia: Fig. 46, squama slightly less than 3 times as long as sagitta, volsella pointed at apex; the last sternite of abdomen: Fig. 77] 7
- 3rd antennal joint longer than 4th, an impression on posterior aspect of propodeum not well outlined; petiole of abdomen having ratio of length to width less than 3:1, with its maximum width locating near its apex; mid metatarsus simple 8
7. Abdomen broadly ferruginous— Japan proper.

***Rhopalum* (*Rhopalum*) *nipponicum* (Kohl)**

— Abdomen entirely black — Hokkaido and the northern parts of Japan proper.

***Rhopalum* (*Rhopalum*) *nipponicum hokkaidense* subsp. nov.**

8. Antenna: Fig. 40. Occipital carina gradually terminated at its ends. [Median groove on area cordata distinct; hind leg with tibia less strongly clavate and with metatarsus more remarkably incrassate than in the subsequent species (Fig. 44); front leg: Fig. 43. Radial cell of forewing: Fig. 61, radial nervure divided by transverse cubital nervure approximately at the ratio of 1:2 (Fig. 61). Clypeus: Fig. 13. Petiole of abdomen: Fig. 27. Genitalia: Fig. 68, volsella shown in Fig. 69, slightly flattened and rounded at apex; 8th sternite: Fig. 78] — Japan proper, Hokkaido and Saghalien.

***Rhopalum* (*Calceorhopalum*) *calceatum* (Tsuneki)**

- Antenna: Fig. 41. Occipital carina abruptly terminated and slightly protruded at its ends. [Median groove on area cordata usually indistinct; hind leg with tibia more strongly clavate and with metatarsus less remarkably incrassate than in the preceding species (Fig. 48); front leg: Fig. 49. Radial cell of forewing with postero-distal angle similar to that of *R. calceatum* but radial nervure divided by transverse cubital nervure at the ratio of 1:3; clypeus: Fig. 14. Petiole of abdomen: Fig. 28. Genitalia: Figs. 70 and 71, apex of squama: Fig. 72] — Hokkaido, Saghalien and the Kurile Islands.

***Rhopalum* (*Calceorhopalum*) *watanabei* sp. nov.**

♀ ♀

1. Head and thorax half-opaque, frontal impressions clearly outlined; petiole of abdomen as long as hind trochanter and femur combined; ocelli in a slightly flattened isosceles triangle; rather large species, 7-8 mm 2
- Head and thorax shining, frontal impressions not clearly outlined; petiole of abdomen less than as long as hind trochanter and femur united; ocelli in a subequilateral triangle; usually small species, 4.5-6.5 mm 3
2. Clypeus: Fig. 5; abdominal petiole 5 times as long as broad at the broadest portion of the segment. [Antennae rather slender, scape distinctly longer than clypeus in the middle, 5th joint longer than width, slightly more than as long as 4th; frontal impressions elongate triangle; vertex between postocelli with well-defined groove; ends of occipital carina gradually terminated; propodeum on posterior surface in middle with an impression which is deep and rather indistinctly bordered, oblique furrow on lateral surfaces distinct and broad; radial cell of forewing: Fig. 59; pygidial area: Fig. 20] — Japan proper, Shikoku, Hokkaido, Saghalien, and the Kurile Islands.

***Rhopalum* (*Latrorhopalum*) *latronum* (Kohl)**

- Clypeus: Fig. 3; abdominal petiole 3.5-4 times as long as broad at broadest portion of the segment. [Antennae comparatively stout, 5th joint slightly wider than long, somewhat less than as long as 4th; frontal impressions anteriorly attenuate and continuous with inner orbital groove of eyes; vertex between postocelli with feeble groove; ends of occipital carina gradually terminated; propodeal impression on posterior surface deep, narrow, rather clearly bounded; oblique furrow on lateral surface less strong and narrow; radial cell in forewing similar to the case of *R. latronum*; pygidial area: Fig. 21] — The Ussuri region, Saghalien and Korea

Rhopalum (Latrorhopalum) laticorne (Tsuneki)

3. Pygidial area with strong median carina except apical portion; 2nd antennal joint longer than 4th; petiole of abdomen having the maximum breadth just in front of apex 4
- Pygidial area without median carina; 2nd antennal joint subequal to, or shorter than 4th; petiole of abdomen with its broadest part at some distance from apex 5
4. Ends of occipital carina gradually terminated on head beneath. [Medio-anterior furrow on mesonotum feeble and shallow; pygidial area with lateral carinae distinct at least up to middle of the segment (Fig. 23); clypeus: Fig. 27; length relation between antennal joints: $2 > 4 = 5 > 3$; petiole of abdomen: Fig. 27] — Japan proper, Hokkaido and Saghalien.

Rhopalum (Calceorhopalum) calceatum (Tsuneki)

- Ends of occipital carina abruptly terminated or somewhat prominent in a tooth. [Medio-anterior furrow on mesonotum deep; pygidial area with lateral carinae only on apical portion (Fig. 24); clypeus: Fig. 28; length relation between antennal joints: $2 = 5 > 3 = 4$; petiole of abdomen: Fig. 28] — Hokkaido, Saghalien and the Kurile Islands.

Rhopalum (Calceorhopalum) watanabei sp. nov.

5. End of occipital carina produced in a tooth; pygidial area triangular, anteriorly divergent and posteriorly gutterwise excavated, shining; petiole with longitudinal carinae on anterior portion; radial cell of forewing with postero-distal angle 90° or nearly (Figs. 59 and 60) 6
- End of occipital carina gradually terminated; pygidial area subrectangular, anteriorly slightly widened, with surface opaque and somewhat roundly swollen except apical portion, its lateral carinae feeble and subparallel anteriorly, (Figs. 18, 19 and 22) petiole without longitudinal carinae on anterior half; radial cell of fore wing with postero-distal angle remarkably obtuse (Fig. 61) 8
6. Radial cell of forewing with postero-distal angle 90° ; 4th antennal joint subequal in length to 2nd and nearly 1.5 times as long as broad at its apex; petiole longer than hind femur, with ratio of length to width approximately 3:1 (Fig. 33). [Clypeus: Fig. 6; pygidial area: Fig. 25; hind tibia fairly strongly clavate and spinose; lateral carinae on posterior surface of propodeum present] — Europe, Japan proper, Hokkaido and the Kurile Islands

Rhopalum (Rhopalum) nigrinum Kiesenwetter

- Radial cell of forewing with postero-distal angle slightly obtuse; 4th antennal joint longer than 2nd and nearly twice as long as broad at its apex; petiole subequal in length to hind femur, with ratio of length to width approximately 2:1 (Fig. 30). [Clypeus: Fig. 9; pygidial area: Fig. 79; hind tibia remarkably clavate and strongly spinose; lateral carinae on posterior surface of propodeum present] 7
7. Abdomen with 2nd, 3rd and 6th segments broadly ferruginous — Japan proper

Rhopalum (Rhopalum) nipponicum (Kohl)

- Abdomen entirely black — Hokkaido and the northern parts of Japan proper

Rhopalum (Rhopalum) nipponicum hokkaidense subsp. nov.

8. Pronotum and anterior half of abdominal petiole amber in colour, axillae and antero-

lateral angles of scutellum cream yellow; medio-anterior furrow on mesonotum deep; in forewing transverse cubital nervure received by radial nervure at the point one-third from base; 2nd joint of hind tarsus approximately ~~three~~^{2 1/2} as long as the metatarsus. [Clypeus: Fig. 1. Antenna: Fig. 42. Abdominal petiole: Fig. 31. Pygidial area: Fig. 18. Lateral carinae on posterior slope of propodeum distinct only at base; — Hokkaido

***Rhopalum (Rhopalum) succineicollarum* sp. nov.**

- Thorax black except humeral angles; medio-anterior furrow on mesonotum shallow; in forewing transverse cubital nervure received by radial nervure at the point approximately one-fourth from base; 2nd joint of hind tarsus nearly ~~twice~~^{2 1/2} as long as the metatarsus; lateral carinae on posterior slope of propodeum present 9
9. Clypeus: Fig. 16; an impression on posterior slope of propodeum shallow. [Pygidial area: Fig. 19] — Hokkaido, the Kurile Islands and northern parts of Japan proper.

***Rhopalum (Rhopalum) jessonicum* (Bischoff)**

- Clypeus: Fig. 11; the impression on posterior slope of propodeum deep. [Pygidial area: Fig. 22. Abdominal petiole: Fig. 26] — The Kurile Islands.

***Rhopalum (Rhopalum) kuwayamai* sp. nov.**

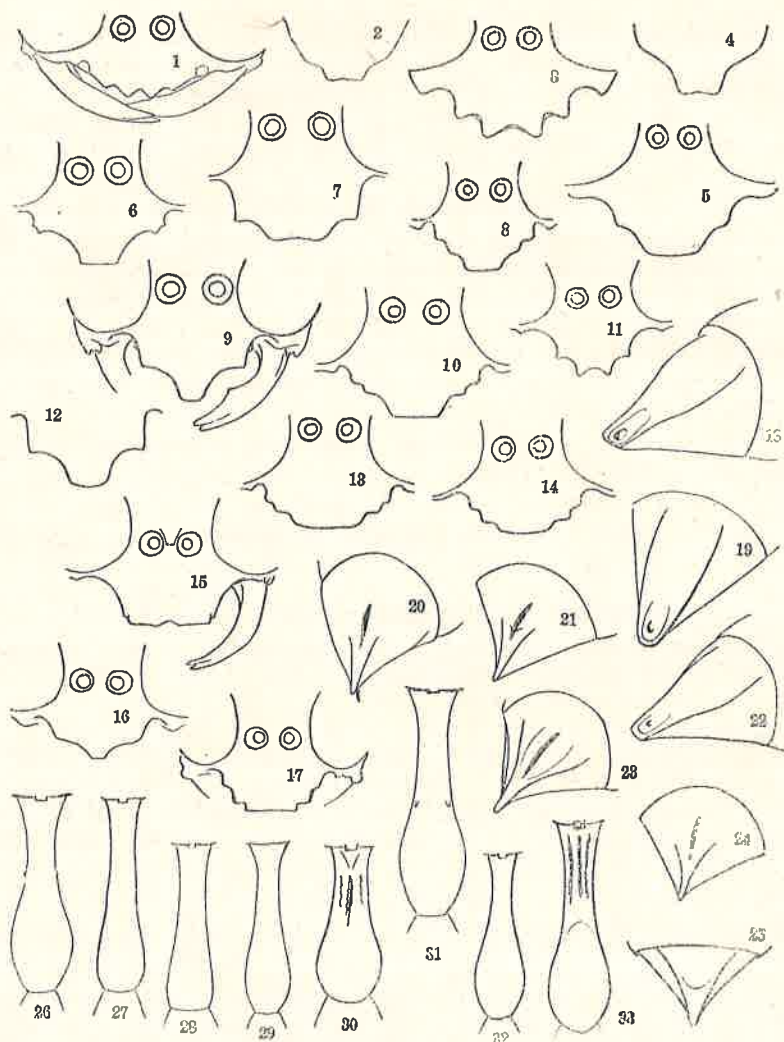
1. *Rhopalum (Latrorhopalum) latronum* (Kohl, 1915)

Crabro (Rhopalum) latronum Kohl, 1915, p. 344; — Iwata, 1933, p. 14; 1938b, p. 88; — Tsuneki, 1947a, p. 294; 1947b, p. 428.
Rhopalum latronum Yasumatsu, 1950, p. 1480.

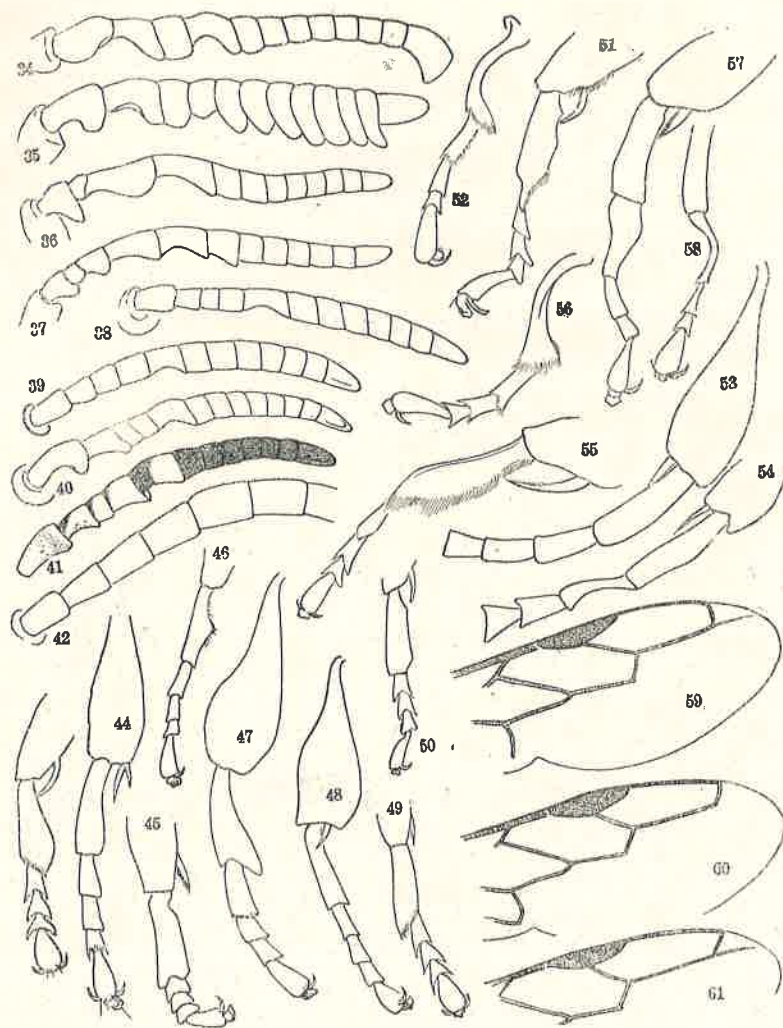
Specimens examined: 1 ♂ 7 ♀♀, Japan proper (Kyoto, Nagano, Fukushima and Tochigi); 1 ♀ 2 ♂♂, Shikoku (Kochi); 57 ♂♂ 96 ♀♀, Hokkaido (Sapporo, Jōzankei, Sounkyo); 2 ♀♀, Saghalien (Tarandomari); 1 ♀, the Kurile Islands (Horomuchiro).

Remarks. Some specimens from Sapporo (exclusively collected in the Botanical Garden) bear a yellow marking on front and mid femora. Such form is generally bright in colour as follows: Greater parts of front tibiae and tarsi, anterior surface of antennal scape and humeral angles cream-yellow; mandibles and antennal flagellum beneath broadly testaceous. While some melanic form from Japan proper bears no yellow marking except the humeral angles.

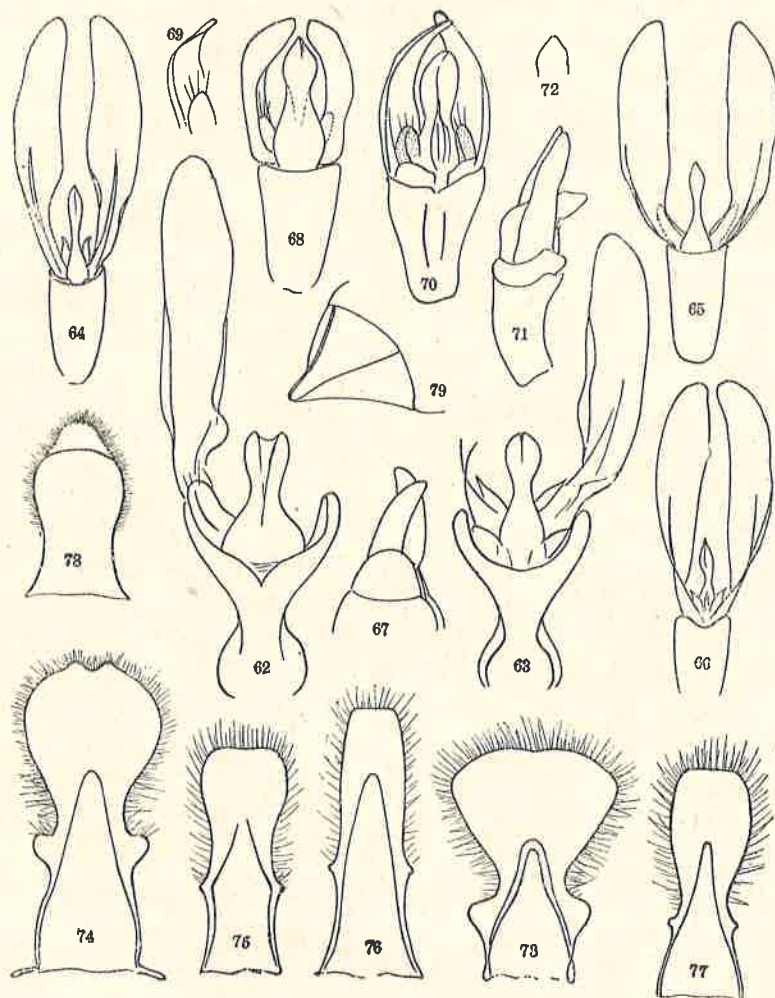
Biology. Several wasps were observed hunting the preys on the tufts of flowers of *Polygonum polymorphum* in the ground of the Hokkaido University. The wasp darted upon a fly, carried it on a near-by leaf and stung it on the under side of its thorax. Sometimes it stung the prey while it was hanging from a flower by one of its hind legs. The nest has yet been undiscovered. The preys examined belonged to Neriidae (*Terepidaria dentigena japonica* Hennig), Dolichopodidae (species undetermined) and Drosophilidae (*Drosophila* sp.).



Figs. 1-17: Clypeus (1. *succineicollae* n. sp., ♀. 2. *laticorne* Tsuneki, ♂. 3. Do., ♀. 4. *latronum* Kohl, ♂. 5. Do., ♀. 6. *nigrinum* Kiesenwetter, ♀. 7. Do., ♂. 8. *watanabei* n. sp., ♀. 9. *nipponicum* Kohl, ♀. 10. *calceatum* Tsuneki, ♀. 11. *kuwayamai* n. sp., ♀. 12. *nipponicum* Kohl, ♂. 13. *calceatum* Tsuneki, ♂. 14. *watanabei* n. sp., ♂. 15. *jessonicum* Bischoff, ♂. 16. Do., ♀. 17. *ebetsuense* n. sp., ♂.) **Figs. 18-25:** Pygidial area (♀). (18. *succineicollae* n. sp. 19. *jessonicum* Bischoff. 20. *latronum* Kohl. 21. *laticorne* Tsuneki. 22. *kuwayamai* n. sp. 23. *calceatum* Tsuneki. 24. *watanabei* n. sp. 25. *nigrinum* Kiesenwetter.) **Figs. 26-33:** Abdominal petiole. (26. *kuwayamai* n. sp., ♀. 27. *calceatum* Tsuneki, ♂ ♀. 28. *watanabei* n. sp., ♂ ♀. 29. *jessonicum* Bischoff, ♂ ♀. 30. *nipponicum* Kohl, ♀ ♂. 31. *succineicollae* n. sp., ♀. 32. *ebetsuense* n. sp., ♂ ♀. 33. *nigrinum* Kiesenwetter, ♂ ♀.)



Figs. 34-42: Antennal flagellum. (34. *latronum* Kohl, ♂. 35. *laticorne* Tsuneki, ♂. 36. *nipponicum* Kohl, ♂. 37. *nigrinum* Kiesenwetter, ♂. 38. *jessonicum* Bischoff, ♂. 39. *epetsuense* n. sp., ♂. 40. *calceatum* Tsuneki, ♂. 41. *watanabei*, n. sp., ♂. 42. *succinei collarum* n. sp., ♀) **Figs. 43-58:** Leg. ♂. (43. *calceatum* Tsuneki (front). 44. Do. (hind). 45. *nipponicum* Kohl (front). 46. Do. (middle). 47. Do. (hind). 48. *Watanabei* n. sp. (hind). 49. Do. (front). 50. *nigrinum* Kiesenw. (front). 51. *latronum* Kohl (front). 52. Do. (middle). 53, 54. Do. (hind). 55. *laticorne* Tsuneki (front). 56. Do. (middle). 57, 58. Do. (hind)) **Figs. 59-61:** Fore wing. (59. *latronum* Kohl. 60. *nipponicum* Kohl. 61. *calceatum* Tsuneki)



Figs. 62-72: Male genitalia. [62. *laticorne* Tsuneki (dorsal view). 63. *latronum* Kohl (dorsal v.). 64. *nipponicum* Kohl (ventral v.). 65. *jessonicum* Bischoff (dorsal v.). 66. *nigrinum* Kiesenw. (ventral v.). 67. *ebetsuense* n. sp. (apex of squamae). 68. *calceatum* Tsuneki (ventral v.). 69. Do. (apex of volsella). 70. *watanabei* n. sp. (ventral v.). 71. Do. (lateral v.); 72. Do. (apex of volsella). **Figs. 73-78:** The last ventral plate of abdomen (δ). (73. *laticorne* Tsuneki. 74. *latronum* Kohl. 75. *nigrinum* Kiesenwetter. 76. *jessonicum* Bischoff. 77. *nipponicum* Kohl. 78. *calceatum* Tsuneki). **Fig. 79.** Pygidial area of *nipponicum* Kohl.

2. *Rhopalum* (*Latrorhopalum*) *laticorne* (Tsuneki, 1947)

Crabro (*Rhopalum*) *latronum* Gussakovskij (nec. Kohl), 1933, p. 27, (♂)

Crabro (*Rhopalum*) *laticornis* Tsuneki, 1947 a, p. 292.

Specimens: 3 ♂♂ 2 ♀♀, North Korea (Daitaku, Nansetsu-rei); 1 ♀, Saghalien (Horo), 16. VIII. 1931, K. Tamanuki leg.

Remarks: Saghalien comes the third place of the distribution of the species.

3. *Rhopalum* (*Rhopalum* sect. *Rhopalum*) *jessonicum* (Bischoff, 1921)

Crabro (*Rhopalum*) *jessonicus* Bischoff, 1921, p. 7; — Tsuneki, 1947 b, p. 429.

Crabro (*Rhopalum*) *clavipes* Iwata, (nec Linné) 1938 b, p. 88; — Tsuneki, 1947 b, p. 429.

The male of this species has hitherto been undescribed.

♂. Closely allied to *R. clavipes* (Linné, 1758), but can be distinguished from the latter in having the clypeus comparatively broader in its median prominent part and slightly incised in the middle. Head from above with ocellar region fairly remarkably depressed, clypeus: Fig. 15; medio-frontal prominence between antennae present but rather feeble, ends of occipital carina not produced nor abruptly terminated; antenna: Fig. 38, with joint 6 equal in length to 4 and 5 united, 4 as long as broad. Area cordata on propodeum with medial groove narrow but distinct, with its surface medianly very finely longitudinally striate, posterior slope of the segment carrying a median lenticular hollow which is broad and deep, not sharply outlined, lateral carinae of the slope definable up to middle of the segment. Petiole of abdomen: Fig. 29, without carinae on anterior portion; length ratio between its total length, maximum width and minimum width 22:6:3; while hind femur (under the same scale) 18, hind tibia 11, and following two tarsal joints 5.5 and 4 respectively; front leg normal, its basitarsus longer than 3 subsequent joints combined. Genitalia: Fig. 65. Radial cell of fore wing with postero-distal angle obtuse, length ratio between transverse radial nervure and basal and apical parts of radial nervure (separated by origin of transverse cubital nervure) 0.6:1:2.8.

Allotype: 1 ♂, Jōzankei, 13. VIII. 1947 (K. Tsuneki leg.).

Specimens examined: 1 ♀, Japan proper (Iwate); 3 ♂♂ 4 ♀♀, Hokkaido (Mt. Daisetsu, Sapporo, Jōzankei); 3 ♂♂, the Kurile Islands (Etorofu). (Type in the writer's collection).

Remarks. In general, this species is smaller and somewhat slenderer in its bodily feature than in *R. clavipes*. Its pubescence on the head and thorax is less remarkable than in the said species. In the female the difference is admissible, as was pointed out in the original description, in the form of the pygidial area. In the present species it appears slenderer than in *clavipes*, with the lateral carinae more distinct and subparallel at the base. In the male of this species, the mandi-

bles are, as a rule, black in colour, but sometimes they are yellow or brownish yellow on the outer surface except the margins. In the female, they are yellow or brownish yellow in colour.

This species may be a geographical race of *R. clavipes* (Linné).

4. *Rhopalum* (*Rhopalum* Sect. *Rhopalum*) *ebetsuense* sp. nov.

♂. Very closely allied to the male of *R. jessonicum* (Bischoff), so that it seems sufficient to give only the differences from this species. Clypeus of different form (Fig. 17, cf. Fig. 15), antennal joint 6 less than as long as united length of 4 and 5, vertex not so noticeably depressed as in the compared species, medial groove on area cordata indistinct, posterior swelling of petiole of abdomen somewhat more remarkable and extending before middle of the segment (cf. Figs. 27 and 32), metatarsus of front leg subequal in length to 3 following joints taken together, hind metatarsus somewhat more strongly incrassate than in *jessonicum*. ♀ unknown.

Holotype: ♂, Ebetsu near Sapporo, 16. VIII. 1947 (M. Munakata leg.).

Paratype: 1 ♂, the same date and place as the Holotype. (Types in the writer's collection).

5. *Rhopalum* (*Rhopalum* sect. *Rhopalum*) *succineicollarum* sp. nov.

♀. Length 7.8 mm. Black. Pronotum, humeral angles, tegulae of wings, anterior half of abdominal petiole, front and mid legs (except femora above and terminal tarsal joints at apex), and apical half of coxae, trochanters beneath, basal broad rings of tibiae of hind legs whitish amber, slightly more whitish on legs and more transparent on pronotum; mandibles (apically brownish), palpi, scapes of antennae, axillae and a spot on antero-lateral angles of scutellum yellowish white; front and mid femora posteriorly yellowish; underside of abdomen, apical margins of 2nd and 3rd tergites and whole of caudal tergite bright testaceous; antennae beneath chestnut brown, hind tibiae and tarsi slightly brownish. Head above with ocellar region fairly strongly depressed, ocelli in a subequilateral triangle, oculo-cellar distance thrice as long as postocellar distance, the former shorter than ocelloccipital distance, frontal median line feeble, without a groove between postocelli, frontal impressions close to inner margins of eyes, small, indistinctly outlined, facial prominence between base of antennae comparatively large and distinct, distance between eyes at base of clypeus longer than clypeus in middle (ratio 10 : 8) and shorter than scape of antenna (ratio 10 : 13). Antenna: Fig. 42, with distal joint apically attenuate and wedgewise compressed as in usual species; clypeus: Fig. 1, mandible bifurcate at apex, without prominence on its inner margin, occipital carina not produced at the ends. Pronotum deeply excavated in middle, prosternal tubercles obtuse at apex, mesonotum with medio-

anterior furrow fairly deep. Area cordata on propodeum not enclosed by crenate groove, but definable by its glabrous and shining surface, with strong notchings at base and with distinct median groove, the latter extends to posterior slope, ending in a deep lenticular hollow, the hollow not sharply outlined, lateral carinae on posterior slope of the segment well-defined only on posterior one third, anteriorly only subridged. Petiole of abdomen: Fig. 31, with stigmata slightly before middle, pygidial area (Fig. 13) basally gently roundly elevated, with a slight hollow at apex; legs normal, front metatarsi longer than 3 subsequent joints united, relative length between petiole, hind trochanter, femur, tibia and 1st and 2nd tarsal joints:— 30 : 9 : 25 : 30 : 17 : 6. Radial cell of forewing with posterior distal angle obtuse, transverse cubital nervure dividing radial nervure at the rate of 1 (base) : 2, transverse radial nervure approximately one sixth of radial nervure. Head and thorax finely and closely punctured with intervals shining, metapleuron and area cordata without puncture and pubescence, highly polished, abdomen practically impunctate, 5th tergite with very fine close punctures, pygidial area dull and opaque, apical segment without hairs.

♂ Unknown.

Holotype: ♀, Sapporo, 18. VIII. 1951 (K. Tsuneki leg.).

Remarks. This species somewhat resembles *R. jessonicum* (Bischoff, 1921), but is easily distinguishable from it by the colour of the pronotum and the abdominal petiole, by the form of the clypeus and by the states of the medio-frontal prominence between the antennae, the medio-anterior groove on the mesonotum and the lateral carinae on the posterior slope of the propodeum.

The specimen was captured in a house, when it was walking on the floor.

6. *Rhopalum* (*Rhopalum* sect. *Rhopalum*) *kuwayamai* sp. nov.

♀. Length 5.0–5.8 mm. Black. Antennae, front and mid femurs above, whole hind legs and sometimes abdomen also chestnut-brown; scape of antennae, humeral angles, front and mid legs, apical portions of hind coxae and trochanters cream-yellow; base of hind tibiae broadly yellowish white; mandibles, palpi and wingtegulae brownish yellow; antennal flagella beneath testaceous brown. Vertex on outside of postocelli fairly despread, frontal median groove broad and deep, frontal impressions indistinct, length ratio between clypeus, minimum distance between eyes and scape of antennae:— 6.5 : 10 : 8; clypeus: Fig. 11; antennal joint 2 subequal in length to 4, and longer than 3; 5 slightly longer than 4, the latter 1.5 times as long as broad at apex, mandibles bifid, ends of occipital carina not prominent. Prosternal tubercles obtuse at apex, medio-anterior furrow on mesonotum feeble or mediocre, area cordata not enclosed by a groove, basally with strongly crenated furrow and medially with feeble longitudinal groove which is at base triangularly excavated, posterior slope of propodeum with a hollow

up-turned ovate, deep, distinctly outlined posteriorly, lateral carinae present which are anteriorly feeble and posteriorly well-defined. Periole of abdomen: Fig. 26. Pygidial area: Fig. 22. Relative length between petiole, hind trochanter, femur, tibia and 1st and 2nd tarsal joints:— 26 : 7 : 23 : 26 : 14 : 6. Radial cell of forewing with posterior distal angle obtuse (approximately 120°), with radial nervure divided by origin of transverse cubital nervure at the rate of 2 : 5.8, its basal part twice as long as transverse radial nervure. Head and thorax finely and closely punctured, but shining, area cordata anteriorly with very fine and close longitudinal striae, rest of the portion and sides of thorax impunctate and polished. Head and thorax except area cordata and metapleuron covered with very short white pubescence, clypeus with appressed silvery hairs as usual, caudal segment glabrous.

♂ Unknown.

Holotype: ♀, the Kurile Islands (Etorofu), 29. VIII. 1940 (S. Kuwayama and Y. Sugihara leg.). *Paratype*: 1 ♀, collected at the same time with the *Holotype*. (*Holotype* in the collection of the Hokkaido Agricultural Experiment Station, *Paratype* in the writer's collection).

Remarks. This species is close to *R. jessonicum* (Bischoff, 1921), but differs from it in the form of the clypeus and in having the frontal medial prominence much more distinct.

7. *Rhopalum* (*Rhopalum* sect. *Corynopus*) *nigrinum* Kiesenwetter, 1849

Crabro (*Rhopalum*) *kiesenwetteri* Tsuneki, 1947 b, p. 428; — Munakata, 1948, p. 56.

Specimens examined: 2 ♂♂ 1 ♀, Japan proper (Tochigi); 26 ♂♂ 17 ♀♀, Hokkaido (Sapporo, Jōzankei, Ebetsu, Nopporo, Sōunkyo); 1 ♀ the Kurile Islands (Kunashiri; T. Uchida et T. Sawada leg.).

Remarks. Specimens assembled in Hokkaido have the body entirely black in colour except for the mandibles yellowish and the tip of the abdomen brownish. While out of the three examples from Japan proper enumerated above two have the middle of the abdomen fairly broadly testaceous brown.

Biology. The writer could confirm the results of observation made by M. Munakata in the vicinity of Sapporo. This species nidificates in hollow stems of reed-canes, separating the brood-chambers with saw-dust and provisions with Psocopterous as well as Dipterous insects (*Psocus tokyoensis* Enderlein, *Ptelodela* sp. *Dolichopus nitidus* Fällén). According to Mr. S. Usuba's informations this species was observed in Tochigi Prefecture nesting in dried stems of *Solidago occidentalis*. The preys sent to the writer from him belonged to small Dipterous insects alone (Dolichopodidae, Trypetidae — *Rivellia basilaris* Wiedemann and Gen. sp. — and Psychodidae — *Psychoda alternata* Say).

8. (A) **Rhopalum (Rhopalum sect. Corynopus) nipponicum**
(Kohl, 1915)

Crabro (Rhopalum) nipponicus Kohl, 1915, p. 342; — Iwata, 1933, p. 13; 1938 b, p. 88.
Rhopalum nipponicus Iwata, 1938 a, p. 37.

Specimens examined: 2 ♂♂ 4 ♀♀, Japan proper (Kyoto, Niigata).

Remarks. This species closely resembles *R. coarctatum* (Scopoli) [= *R. tibiale* (Fabr.)] occurring in Europe. The female, however, can be distinguished from the latter species, as was described by Kohl, in having the clypeus more obtusely, rather rectangularly produced in the middle and in having the prosternal tubercles more obtusely pointed at the apex. Similar differences can be met with in the male. Moreover, in the latter sex the basal constriction and the spical incrassation of the 4th and 5th joints of antennae appear to be somewhat less remarkable than in the compared species, although the general feature and coloration of the antennae are much the same in both the species.

A specimen from Niigata Pref. is exceptionatly large, measuring 8.2 mm.

Biology. According to Dr. K. Iwata, this species nidificates in the dead twigs of *Sambucus* and *Diervilla*. The cells are arranged either in a branched or a simple lineal order. The preys are said to belong to species of Chironomidae (*Chironomus dorsalis* M.), Tipulidae (*Erioptera asymmetrica*, *Dicranomyia takahashi*) and Culexidae. The number of preys one per cell is from 4 to 21.

8. (B) **Rhopalum (Rhopalum sect. Corynopus) nipponicum**
hokkaidense subsp. nov.

Crabro (Rhopalum) nipponicus Tsuneki, 1947 b, p. 429.

The present subspecies differs from the nominate form in having the abdomen entirely black in colour. This subspecies is known only from Hokkaido and Tochigi Pref. (Nikko — 1,000 m. high). Therefore, it seems to represent a northern form of the original species.

Specimens examined: 122 ♂♂ 37 ♀♀, Hokkaido (Sapporo, Jōzankei, Kamikawa, Akkeshi); 1 ♀. Japan proper (Nikko).

Remarks. Similar colour form is observed in the European *R. coarctatum* Scop., but its distributional relationship is unknown to the writer.

Biology. A nest of this wasp observed at Sapporo was made in an abandoned burrow of some boring beetle larva. The tunnel was burrowed in the compactly pressed wood-chips left by the beetle larva and involved several cells linearly arranged, the latter being provisioned with preys belonging to a species of Limoniidae.

9. **Rhopalum (Calceorhopalum) calceatum** (Tsuneki, 1947)

Crabro (Rhopalum) calceatus Tsuneki, 1947 b, p. 430.

Specimens examined : 1 ♀, Japan proper (Nikko, E. Tanaka, leg.); 97 ♂♂ 38 ♀♀, Hokkaido (Sapporo, Jôzankei, Nopporo); 1 ♂, Saghalien (Ohtani, 22. VIII. 1914, S. Isshiki leg.).

Biology. According to the information of Mr. E. Tanaka, in Chuzenji, Nikko, this species provisions its larval cells with Psocopterous insects.

10. *Rhopalum (Calceorhopalum) watanabei* sp. nov.

♂. Similar in colour and general structure to *R. calceatum* (Tsuneki), but separable therefrom in the following points:

1) The form and the colour of antennae (Fig. 41, cf. Fig. 40). 2) Hind legs with tibiae more strongly clavate and with metatarsi less remarkably incassate (Fig. 48, cf. Fig. 44). 3) Occipital carina abruptly terminated and slightly produced at the ends. 4) Mesonotum medio-anteriorly more deeply furrowed than in *calceatum*. 5) Median groove on area cordata distinct. 6) Metatarsus of front leg less remarkably dilated (Fig. 49, cf. Fig. 43). 7) In fore wing transverse cubital nervure received by radial nervure at the point one fourth from base (in *calceatum* approximately one third from base).

Medio-frontal prominence between antennae present, but very feeble as in *calceatum* or *jessonicum*, lateral carinae on posterior aspect of propodeum distinct up to about one third of the area as in *calceatum*, petiole of abdomen without longitudinal ridges anteriorly, its relative length to hind femur slightly smaller than in *calceatum* (21:19, in the compared species 23:18). Length 5.3-6.0 mm.

♀. Very closely resembles the female of *calceatum*, but can be distinguished from it in the characters of occipital carina, pygidial area, in the relative length between antennal joints and in the states of medio-anterior furrow on mesonotum as given in the key to species.

Holotype: ♂, Hokkaido (Jôzankei) 10. VIII. 1948. (K. Tsuneki leg.).
Allotype: ♀, Hokkaido (Jôzankei), 14. VIII. 1946. (K. Tsuneki leg.). *Paratypes*: 1 ♂, Saghalien (Kaiba Island), 30. VII. 1934. (C. Watanabe leg.) 2 ♂♂ 2 ♀♀ the Kuriles (Etorofu), 29. VII-3.VIII. 1940. (S. Kuwayama and Y. Sugihara leg.); 1 ♀, Hokkaido (Jôzankei), 13. VIII. 1949. (K. Tsuneki leg.).

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