

Taxonomic Studies on the Pompilidae Occurring in Japan North of the Ryukyus: Genus *Dipogon*, Subgenus *Deuteragenia* (Hymenoptera) (Part 2)

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Abstract. Two species-groups of the subgenus *Deuteragenia*, genus *Dipogon*, occurring in Japan are treated. In the *Dipogon vechti* species-group, *D. vechti* and *D. romankovae* are recorded from Japan and redescribed, and *D. albithrix* sp. nov. is described. In the *D. granulifrons* species-group, *D. granulifrons* sp. nov. and *D. carychroceraeus* sp. nov. are described.

Key words: taxonomy, *Dipogon vechti* species-group, *Dipogon granulifrons* species-group.

Introduction

Deuteragenia Šusterka, 1912, is the largest, cosmopolitan subgenus of the genus *Dipogon* Fox, 1897. In his revision of the Nearctic Pepsinae and Ceropalinae, Townes (1957) recognized two species-groups in this subgenus, the *D. pulchripennis* and *D. variegatus* species-groups. Townes' system was adopted by Evans (1974) in his review of the *Dipogon* occurring in Central America, Mexico and extreme southern United States; the system, however, has not been applied for the species of the other parts of the world.

With respect to the Japanese species, *D. bifasciatus* (Geoffroy, 1785), *D. nipponicus* (Yasumatsu, 1939), *D. romankovae* Lelej, 1986, *D. vechti* Day, 1979 and *D. albithrix*, described as a new species in this paper, match the *Dipogon variegatus* species-group in Townes' system. However, applicability of Townes' system to world-wide species of *Deuteragenia* is still questionable. Actually, the remaining Japanese species do not match the definitions of the two species-groups of Townes' system. Taking such situation into consideration, we tentatively divided Japanese species of *Deuteragenia* into five species-groups (i.e., the *Dipogon conspersus*, *D. vechti*, *D. granulifrons*, *D. immarginatus* and *D. bifasciatus* species-groups). Of these, the first group was reviewed in the first part of this series (Shimizu & Ishikawa, 2002). The second and third groups are treated in the present paper in which three species, including one new species, in the *D. vechti* species-group and two new species in the *D.*

granulifrons species-group are described. The last two groups will be dealt with in the final part of this series, together with keys to the five species-groups in Japan as well as species treated in this series.

The terminology of the wing veins and cells follows Day (1988). The following abbreviations are used for morphological terms: LID, lower interocular distance; MID, middle interocular distance; OOL, ocello-ocular line; POL, postocellar line; SMC, submarginal cell of forewing; UID, upper interocular distance.

Descriptions

Dipogon vechti species-group

This group is distinguished from the other species-groups of Japanese *Deuteragenia* by the clypeus with a strongly depressed apical rim and a preapical ridge distinct medially in the female (Figs. 45–47), and by the sternum VI with a pair of very large lateral hooks directed posteromedially and a tuft of dense erect hairs close by each lateral hook in the male (Figs. 14, 27, 41, 42).

Female. Body polished, finely and densely punctate. Pubescence not very short as in the *D. conspersus* species-group of Shimizu & Ishikawa (2002). Clypeus with preapical setiferous pores large. Postnotum narrow and depressed medially. Propodeum with long hairs on lateral sides, their sockets not much larger than normal punctures.

Male. Clypeus sometimes with a feebly depressed

apical rim; preapical portion convex but without a sharply edged ridge. Flagellomeres II–XI serrate below, in profile strongly constricted at base and angularly produced near base or at about basal 1/3 (Figs. 11, 26). Postnotum not always so strongly narrowed and depressed medially as in the female. Exposed part of subgenital plate not very narrow nor needle-shaped, broadly carinate or flattened along midline, not strongly convex in lateral view (Figs. 12–14, 28, 29, 41, 42). Genitalia with paramere extending far beyond apex of aedeagus (Figs. 15, 16, 30, 31, 43, 44); basal hooklets double.

Dipogon romankovae Lelej

[Japanese name: Usuge-hige-bekkô]

(Figs. 1–16, 45)

Dipogon (Deuteragenia) romankovae Lelej, 1986: 802, ♀, ♂.

[Holotype ♀: Primorskij, Russia (Zoological Institute, Sankt Petersburg, Russia)]

This species is characterized by an enclosed subapical light gray area on the forewing (Fig. 3), short and sparse hairs on the head, mesosoma except propodeum, and femora (Fig. 7) in both sexes, and a weak preapical ridge of the clypeus (Fig. 45) in the female.

Female. Body length: 5.6–11.7 mm; forewing length: 5.8–10.4 mm.

Body and legs black; head and mesosoma weakly, metasoma more strongly polished; apical portion of mandible rufous; anteroventral face of flagellum, posterolateral margin of metanotum, lateral portion of metasomal tergum I and apices of fore tarsomeres I–IV often ferruginous; beard dark brown.

Wings hyaline. Forewing (Fig. 3) with two fuscous bands; inner band extending posteriorly beyond vein A, attaining wing margin, and extending anteriorly along vein M, attaining vein Sc + R + Rs; outer band occupying basal 2/3 of marginal cell, apical portion of SMC1, SMC2 and 3, basal portion of SMC4, apical portion of discal 1, apical 2/3 of discal 2 and basal portion of discal 3; outer wing margin and most parts of discal 3 and subdiscal 2 weakly infuscate, subapical light gray area enclosed. Hindwing feebly and broadly infuscate along outer margin.

Frons and vertex alutaceous, with fine dense punctures. Dorsa of pro-, meso- and metanota more finely punctate. Metanotum with several strong striae laterally. Upper metapleuron finely striate and punctate; lower metapleuron almost impunctate but finely tessellate. Propodeum finely and densely punctate; posterolateral portion without rugae. Metasoma minutely

and densely punctate.

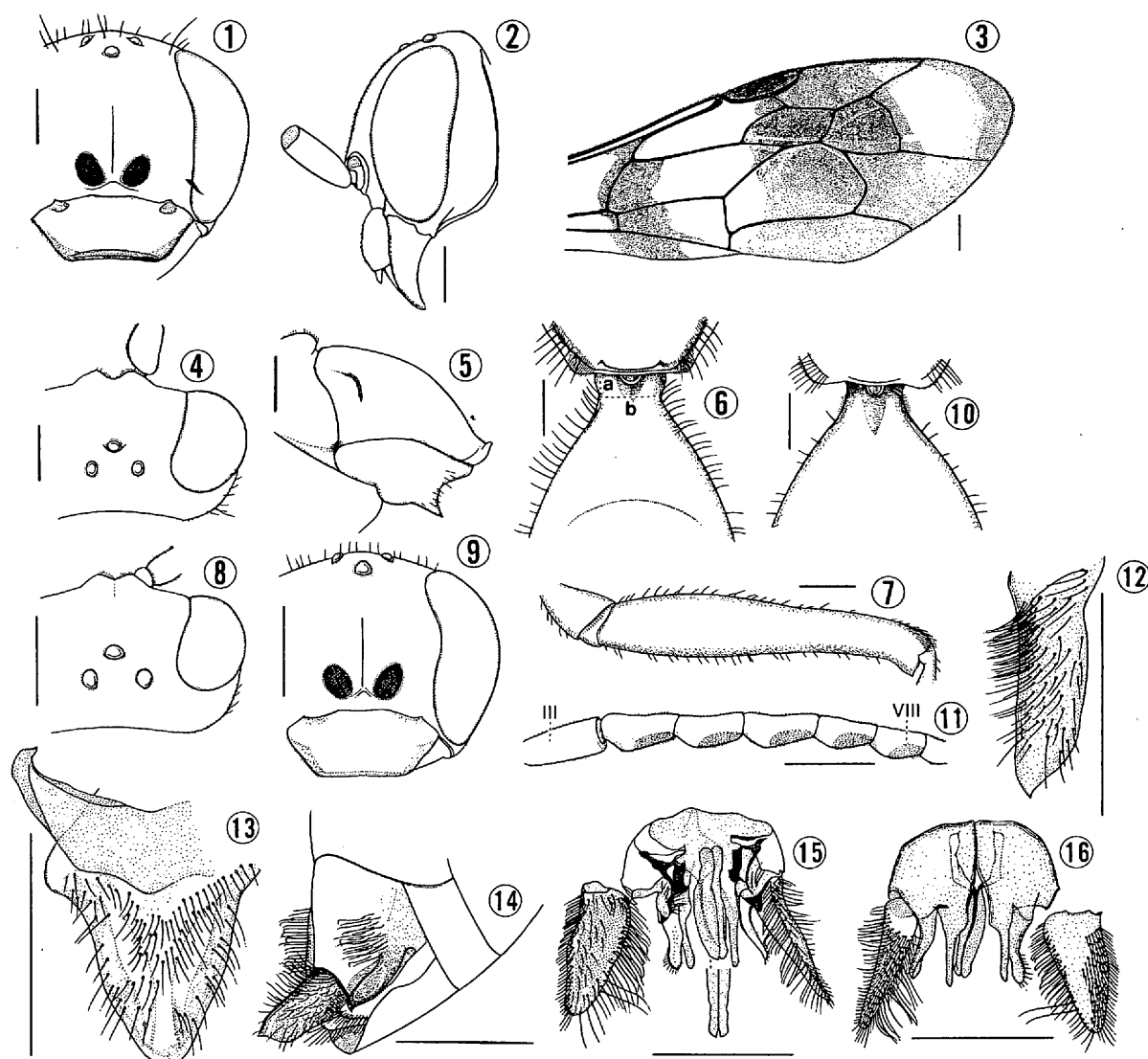
Pubescence on body and appendages inconspicuous, mostly pale brown but light gray on lower frons, lateral side of mesosoma and coxae above. Erect hairs on body not abundant, mostly brown; hairs on lateral side of mesosoma and coxae light gray, but not white, not long nor abundant as in the other species of this species-group. Lateral sides of metasomal terga I–II, and sternum I with short, erect, pale brown hairs; terga III–VI and sterna II–VI with longer, bristly, fulvous hairs, which are very long and dense on last tergum and sternum. Undersides of mid and hind femora with very short, sparse, light gray hairs (Fig. 7).

Head in frontal view 1.1–1.2× as wide as long (Fig. 1). Vertex gently convex between eye tops. Frons weakly raised just above antennal sockets (Fig. 4), with a faint median line evanescent on its upper half. Antennocular line (anterior margin of frons in dorsal view) slightly to moderately inclined from antennal base toward eye. Inner orbits strongly convergent above, subparallel below. UID : MID : LID = 7.0–7.6 : 10 : 9.4–9.9. MID 0.58–0.63× head width. Ocelli forming a right triangle. POL : OOL = 1 : 0.76–1.0. POL 1.5–1.9× as long as width of anterior ocellus. Clypeus slightly wider than LID, 2.5–2.8× as wide as long; surface convex medially, depressed just below anterior tentorial pits and in anterolateral portions; apical margin with a depressed, narrow impunctate rim, which is not clearly delimited laterally; preapical ridge just behind the rim less strongly raised than in *D. vechti*, obliquely subtruncate but not sharply edged, its surface alutaceous (Fig. 45). Malar space very narrow. Genae in dorsal view strongly convergent posteriorly behind eyes (Fig. 4), in profile 0.6–0.8× eye width (Fig. 2). Flagellomeres I and II in a ratio of 10 : 8.0–8.6; flagellomere I 4.3–4.7× as long as thick and 0.82–0.99× as long as UID.

Pronotum with shoulders scarcely swollen; posterior portion not depressed in front of posterior margin, which is arcuate, often with a small median notch. Mesoscutum with posterolateral margin not reflexed. Postnotum 0.1–0.2× as long as metanotum along midline. Propodeum gently convex in profile (Fig. 5); median groove faint or obsolete.

Metasomal tergum I petiolate (i.e., the tergum is narrowed just behind articulation with propodeum), but petiole very short ($a < b$ in Fig. 6: a, length of petiole between base and greatest constriction; b, width of petiole at greatest constriction).

Forewing (Fig. 3) with crossvein 3rs-m nearly straight medially. SMC2 receiving crossvein 1m-cu



Figs. 1-16. *Dipogon romankovae* (1-7, ♀ and 8-16, ♂ from Hokkaido). — 1, 2, 4, 8, 9, head (1, 9, frontal view; 2, lateral view; 4, 8, dorsal view); 3, forewing; 5, propodeum, lateral view; 6, 10, metasomal tergum I, dorsal view; 7, hind femur, outer view; 11, part of flagellum, outer view; 12, subgenital plate (sternum VIII), lateral view; 13, sterna VII-VIII, ventral view; 14, apical metasomal segments, ventrolateral view; 15, 16, genitalia (15, ventral view; 16, dorsal view). Scales: 0.5 mm.

slightly beyond middle. SMC3 1.1-1.4× as long as SMC2 on vein M, narrowed on vein Rs by 0.35-0.59× its length on vein M, receiving crossvein 2m-cu at basal 0.23-0.38. Crossvein cu-a originating at the point slightly distal to the fork of vein M+CuA. Hindwing crossvein rs-m nearly straight, oblique to vein M.

Mid tibia with several short spines on outer and dorsal faces. Hind tibia with weak, sparse spines on outer face and short brown hairs on dorsal face.

Male. Body length: 5.6-7.5 mm; forewing length: 5.2-6.5 mm.

Similar to the female. Apical portions of mandible, fore tibia and fore tarsomeres I-IV, and sometimes

lower portion of flagellum ferruginous; fore tibial spur pale yellow or light brown. Banding of forewing weaker than in the female; inner band sometimes evanescent.

Punctures on body stronger than in the female; propodeum weakly striate. Hairs on body and legs weaker than in the female; metasoma with short hairs, which are dense on terga VI-VII and sterna VI and VIII. Mid and hind femora below almost hairless.

Head in frontal view 1.1× as wide as long (Fig. 9). UID : MID : LID = 7.7-8.2 : 10 : 8.7-9.2. MID 0.58-0.62× head width. Ocelli forming a right to obtuse triangle; ocellar area slightly raised. POL : OOL = 1 : 0.69-0.90. POL 1.5-1.8× as long as width of anterior

ocellus. Clypeus large, $2.1\text{--}2.5\times$ as wide as long; apical rim feebly or not depressed at middle. Gena in dorsal view more developed than in the female (Fig. 8), $0.6\text{--}0.7\times$ eye width in profile. Flagellomeres II–XI more strongly serrate below (Fig. 11) than in *D. vechti* (Fig. 26); flagellomeres I and II in a ratio of 10 : 9.7–10; flagellomere I $2.1\text{--}3.1\times$ as long as thick.

Pronotum with shoulders not convex. Postnotum more developed than in the female, $0.13\text{--}0.35\times$ as long as metanotum.

Metasomal tergum I narrowed but scarcely petiolate basally (Fig. 10). Sternum VI with a group of perpendicular bristly setae of equal length close by each lateral hook (Fig. 14); lateral hook directed posteromedially, blade-shaped, broadest beyond middle, strongly polished apically; its posterior margin broadly and weakly emarginate near apex; posterior margin of sternum VI between the hooks arcuately emarginate. Subgenital plate (Figs. 12–14) compressed laterally but broadly carinate, covered with long erect setae most densely in the median portion of basal half; apical margin in ventral view rounded (Fig. 13).

Genitalia (Figs. 15, 16): paramere with long setae on ventral margin and shorter setae on dorsal and outer faces; parapenial lobe extending slightly beyond apex of aedeagus.

Forewing vein Rs strongly angulate at juncture with crossvein 2rs-m. SMC3 $0.98\text{--}1.5\times$ as long as SMC2 on vein M, narrowed on vein Rs by $0.38\text{--}0.49\times$ its length on vein M, receiving crossvein 2m-cu at basal $0.25\text{--}0.39$.

Distribution. Japan: Hokkaido and Honshu; Primorskiy Kray, Russia (Lelej, 1986).

Specimens examined. Japan: Hokkaido: 1♀, Shikaripetsu, viii-26, 1922 (T. Esaki); 1♀, Mt. Daisetsu, vii-13, 1960 (S. Takagi); 1♀, Moiwayama, Sapporo, vii-16, 1958 (S. Momoi); 1♀, Sapporo, ix-11, 1958 (S. Uéda); 1♂, Fushimi, Sapporo, ix-18, 1957 (T. Nambu); 1♂, Jozankei, vi-30, 1958 (K. Kamijo); Honshu: 1♀, Mt. Tyohkeimori, Sohma, Yanagi, Aomori Pref., ix-23, 1988 (Y. Yamada); 1♀, Mt. Zao, Miyagi Pref., vi-30, 1979 (K. Kojima & T. Nishioka); 1♀, Yugu, Kuroiso, Tochigi Pref., ix-22, 2001 (E. Katayama); 1♀, Ichinokurasawa, Mt. Tanigawa, Gunma Pref., viii-22, 1988 (T. Nambu); 1♂, Ogawamura, Higashi-Ibaraki-gun, Ibaraki Pref. (S. Makino); 1♀, Inukoeji, Nakagawa, Yamakita-machi, Ashigarakami-gun, Kanagawa Pref., ix-9, 1995 (K. Kubo); 1♂, Mt. Komagatake, 1,000–1,300 m alt. Hakone, Kanagawa Pref., viii-11, 2000 (H. Nagase); 1♀, Mikuni-tôge, 1,100 m alt. Yamakita-machi, Ashigarakami-gun, Kanagawa Pref., viii-24, 2000 (H.

Nagase); 1♀, Amagi-tôge, Amagi-yugashima, Shizuoka Pref., vii-10, 2001 (R. Oomuta); 1♀, Decid. forest, Ohkuwa, Suhara, Nagano Pref., viii-18–24, 1996 (Y. Jishage); 1♀, same locality, ix-15–21, 1996 (Y. Jishage); 1♀, Arashi, Ôno-shi, Fukui Pref., vii-8, 1978 (T. Tano); 1♀, Rokuroshi, Ôno-shi, Fukui Pref., ix-22, 1995 (Y. Haneda); 1♀, Tamodani, Obama-shi, Fukui Pref., vii-19, 1982 (Y. Haneda). **Russia:** Primorskiy Kray: 1♀, “Primore LG3 14S Kievki Romankova 6. vii 983 48D82”; 1♂, “Primorskii Kr. Lazovskii zap-k Kievka Romankova 1980” “гнездо I 6D”.

Dipogon vechti Day

[Japanese name: Kuchiheri-hige-bekkô]

(Figs. 17–31, 46)

Dipogon (Deuteragenia) vechti Day, 1979: 9. [Holotype ♀: Siberia, Amur (The Natural History Museum, London)]

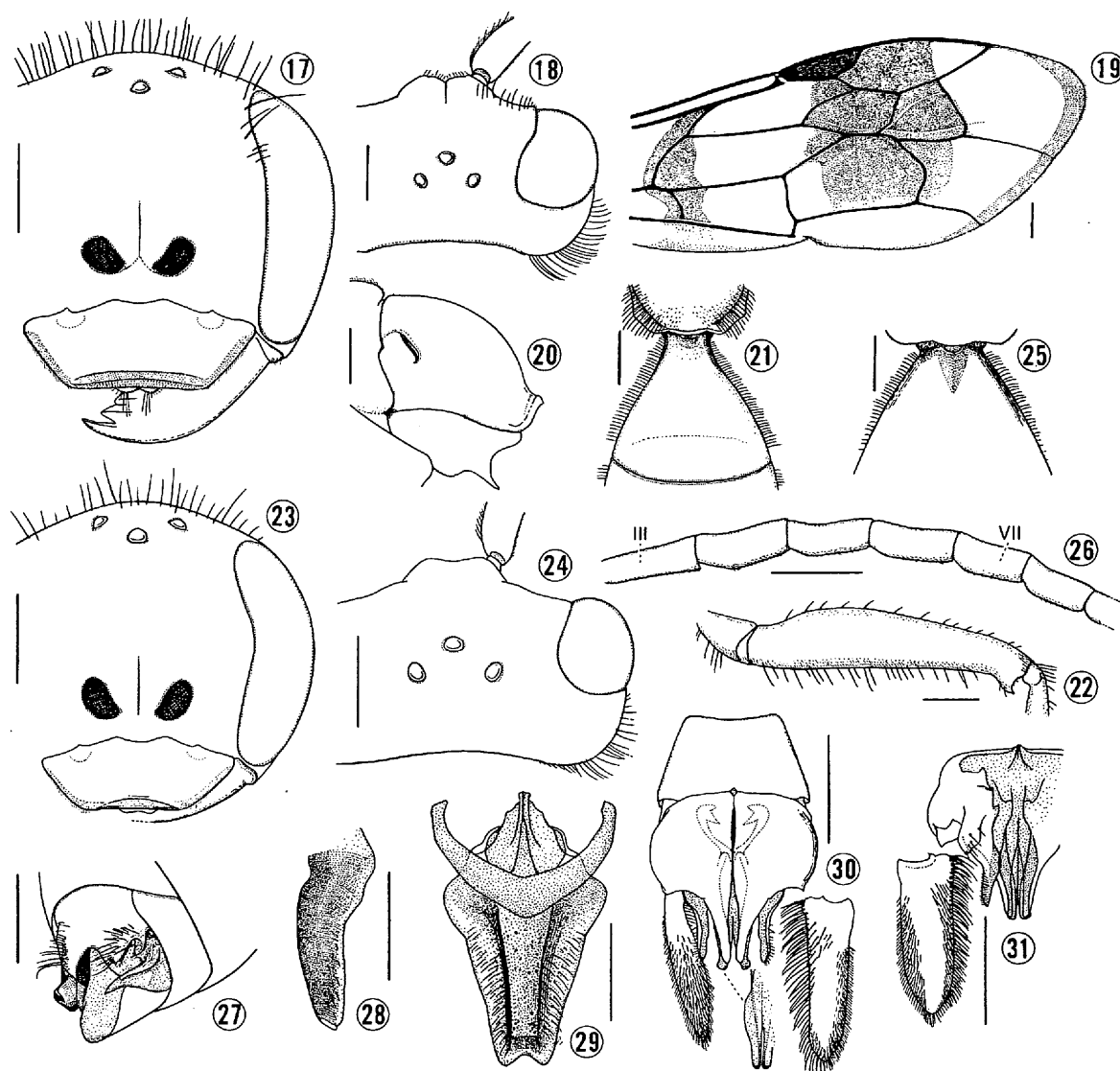
Many authors misidentified this species as *Dipogon (Deuteragenia) bifasciatus* (Geoffroy, 1785) (see Day, 1979).

The most conspicuous characteristics of this species are a strongly raised, sharply edged preapical ridge and a deeply depressed, broad apical rim of the clypeus (Fig. 46). This species is similar to Nearctic *D. sayi* Banks, 1941, but is distinguished from the latter by its more sharply edged preapical ridge of the clypeus, more swollen gena and more hairy body and legs in the female. *Dipogon vechti* is also similar to European *D. austriacus* Wolf, 1964, but is distinguished from the species by its nearly straight forewing crossvein 3rs-m, more strongly hairy femora and narrower outer band of the forewing in the female, and by its ill-defined apical rim of the clypeus, strongly incurved, smooth and polished lateral hooks of the sternum VI, and laterally and strongly compressed but broadly carinate subgenital plate in the male.

Female. Body length: 8.6–11.3 mm; forewing length: 8.0–9.7 mm.

Body and legs black, smooth and strongly polished; apical portion of mandible, lateral portion of tergum I and apices of fore tarsomeres I–IV ferruginous; basal half of fore tibial spur light brown; in some specimens anteroventral face of flagellum, posterolateral margins of pronotum and metanotum, lateral and posterior margins of metasomal terga and posterior margins of metasomal sterna also ferruginous; beard dark brown.

Wings hyaline. Forewing (Fig. 19) with two fuscous bands; inner band strong and extending anteriorly along vein M, attaining vein Sc + R + Rs, but



Figs. 17-31. *Dipogon vechti* (17-22, ♀ from Nagano Pref., Honshu; 23-31, ♂ from Hokkaido). — 17, 18, 23, 24, head (17, 23, frontal view; 18, 24, dorsal view); 19, forewing; 20, propodeum, lateral view; 21, 25, metasomal tergum I, dorsal view; 22, hind femur, outer view; 26, part of flagellum, outer view; 27, sternum VI, ventrolateral view; 28, sternum VIII, lateral view; 29, sternum VII-VIII, ventral view; 30, 31, genitalia (30, dorsal view; 31, ventral view). Scales: 0.5 mm.

weak in the portion posterior to vein A; outer band occupying basal 2/3 of marginal cell, apical portion of SMC1, SMC2 and 3, apical portion of discal 1, apical 2/3 of discal 2 and basal portion of discal 3, scarcely extending distally beyond crossvein 3rs-m; outer wing margin weakly infuscate; subapical light gray area not clearly enclosed.

Frons with dense punctures, which are irregularly spaced in upper portion. Mesoscutum with dense, irregularly spaced punctures. Discs of scutellum and metanotum more weakly punctate. Metanotum with several strong striae laterally. Upper metapleuron finely striate and punctate; lower metapleuron finely punctate. Propodeum with dense, irregularly spaced, strong punctures; posterolateral portion without

rugae. Metasoma with minute, irregularly spaced punctures.

Body with pubescence brown, but lower frons, lateral side of mesosoma and dorsal sides of coxae with light gray pubescence in some specimens. Hairs on body strong; frons, vertex and gena with long hairs, pale to dark brown; dorsa of pro-, meso- and metanota with mostly short, dark brown hairs, but scutellum and metanotum with longer ones; the rest of mesosoma with long, pale brown hairs; metasomal hairs brown, becoming longer and darker toward apex; coxae, and undersides of trochanters and femora abundantly with short, pale brown hairs (Fig. 22).

Head in frontal view 1.1-1.2× as wide as long (Fig. 17). Vertex more convex between eye tops than in *D.*

romankovae. Frons strongly raised just above antennal sockets (Fig. 18), with a median line impressed below. Antennocular line strongly inclined from antennal base toward eye. Inner orbits weakly convergent above. UID : MID : LID = 7.5–8.3 : 10 : 9.4–9.8. Eye narrow, compared with frons; MID 0.61–0.64× head width. Ocelli forming an obtuse triangle. POL : OOL = 1 : 0.95–1.3. POL 2.0–2.3× width of anterior ocellus. Clypeus short, as wide as LID, 2.6–2.9× as wide as long, convex medially, depressed laterally; apical rim strongly depressed, broader medially than laterally; preapical ridge just behind the rim strongly raised and sharply edged (Fig. 46), its anterior declivity concave and polished. Malar space very narrow. Gena swollen (Fig. 18), in profile 0.9–1.0× eye width. Flagellomeres I and II in a ratio of 10 : 8.1–8.6; flagellomere I stouter than in *D. romankovae* and *D. albithrix*, 3.5–3.9× as long as thick and 0.66–0.74× as long as UID.

Pronotum with shoulders convex; anterior vertical declivity distinct, narrow and short; posterior portion slightly depressed in front of posterior margin, which is arcuate with a small median notch. Mesoscutum with posterolateral margin narrowly and feebly raised. Postnotum less than 0.1× as long as metanotum along midline, deeply sunk between metanotum and propodeum. Propodeum in profile (Fig. 20) more convex than in *D. romankovae*, with a faint median groove; erect hairs on lateral sides very long and abundant.

Metasomal tergum I not petiolate (Fig. 21).

Forewing (Fig. 19) with crossvein 3rs-m nearly straight. SMC2 receiving crossvein 1m-cu beyond middle. SMC3 1.0–1.3× as long as SMC2 on vein M, narrowed on vein Rs by 0.39–0.57× its length on vein M, receiving crossvein 2m-cu at basal 0.24–0.35. Crossvein cu-a originating at the point distal to the fork of vein M+CuA by 0.5 or more of its length. Hindwing crossvein rs-m nearly straight, oblique to vein M.

Mid tibia with many short spines on outer and dorsal faces. Hind tibia with weak, sparse spines on outer face and bristly fulvous hairs on dorsal face.

Male. Body length: 8.4–9.0 mm; forewing length: 7.6 mm.

Similar to the female. Body and legs black; less shiny and polished than in the female; apical portion of mandible, apices of fore tibia and fore tarsomeres I–IV, and lateral portion of tergum I more or less ferruginous; fore tibial spur pale yellow. Banding of forewing distinct as in the female.

Punctures on body, especially on propodeum, stronger than in the female. Propodeum weakly

rugoso-punctate in lateral and posterior portions. Hairs on body and legs shorter than in the female; metasomal terga I and VI–VII and sterna I–VI with comparatively dense, short erect hairs. Mid and hind femora below with short sparse light gray hairs.

Head in frontal view 1.1–1.2× as wide as long (Fig. 23). MID 0.62–0.63× head width. UID : MID : LID = 8.3–8.5 : 10 : 9.2. Ocelli forming an obtuse triangle. POL : OOL = 1 : 0.85–0.94. Clypeus 2.3–2.7× as wide as long, moderately to strongly convex near apex; apical rim very narrow, not well defined but polished. Gena more developed than in the female (Fig. 24), about 1× eye width in profile. Flagellomeres I and II in a ratio of 10 : 9.1–9.2; flagellomere I slenderer than in *D. romankovae* and *D. albithrix*, 2.8–2.9× as long as thick, 0.45–0.53× as long as UID.

Pronotum with shoulders less convex than in the female. Postnotum about 0.1× as long as metanotum along midline. Propodeum moderately to strongly convex.

Tergum I not petiolate basally (Fig. 25). Sternum VI with a sublateral ridge close by each lateral hook (Fig. 27); sublateral ridge with long erect bristly hairs of irregular length; lateral hook strongly incurved, very broad at base, abruptly narrowed beyond middle, tapering to a sharp point; surface smooth and polished except base; posterior margin of sternum VI deeply emarginate between hooks. Subgenital plate (Figs. 28, 29) strongly compressed and concave laterally, broadly carinate medially; median carina smooth, sparsely punctate, almost devoid of hairs; lateral margins in ventral view gradually convergent toward apex; apical margin emarginate.

Genitalia (Figs. 30, 31): paramere broad, with long setae on ventral margin and shorter setae on dorsal face; parapenial lobe not extending beyond apex of aedeagus; aedeagus broadest at middle, gradually narrowing toward apex.

Forewing SMC3 1.2–1.4× as long as SMC2 on vein M, narrowed on vein Rs by 0.54–0.56× its length on vein M, receiving crossvein 2m-cu at basal 0.28–0.31.

Distribution. Japan: Hokkaido and Honshu; Primorskiy Krai, Russia (Lelej, 1986); Central Asia (Wolf, 1972); Europe (Wolf, 1964, 1972; Wahis, 1974; Day, 1979).

Specimens examined. Japan: Hokkaido: 1♀, Horokanai, vii-30, 1958 (K. Kamijo); 1♀, Teshikaga, viii-3, 1983 (H. Nagase); 1♀, Nukabira, vii-12, 1959 (T. Nambu); 1♀, same locality, vii-13, 1959 (S. Momoi); 1♀, same locality, vii-13, 1985 (I. Togashi); 1♀, Jyozankei, viii-17, 1958 (R. & F. Ishikawa); 2♀1♂, Shiraito-

notaki, nr Jyozankei, vi-27, 1958 (R. & F. Ishikawa); Honshu: 1♀, Mt. Tadeshina, Nagano Pref., vii-14, 1953 (R. Ishikawa). **Europe:** 1♀, Linz a. D., Ob. Ost., Umgeb. vii-7, 1960, Haselgraben (K. Kusudas); 1♀, F.-Loiret, Ardon (DN1898), v-23, 1990 (A. Larivière) (bac jaune); paratype ♂, "Saaletal Schönburg Blüthgen leg." "*Deuteragenia bifasciata* (F.) ♂ Blüthgen det. 1943" "Paratype *Dipogon vechti* ♂ det. M. C. Day, 1977".

***Dipogon albithrix* sp. nov.**

[Japanese name: Shiroge-hige-bekkô]

(Figs. 32-44, 47)

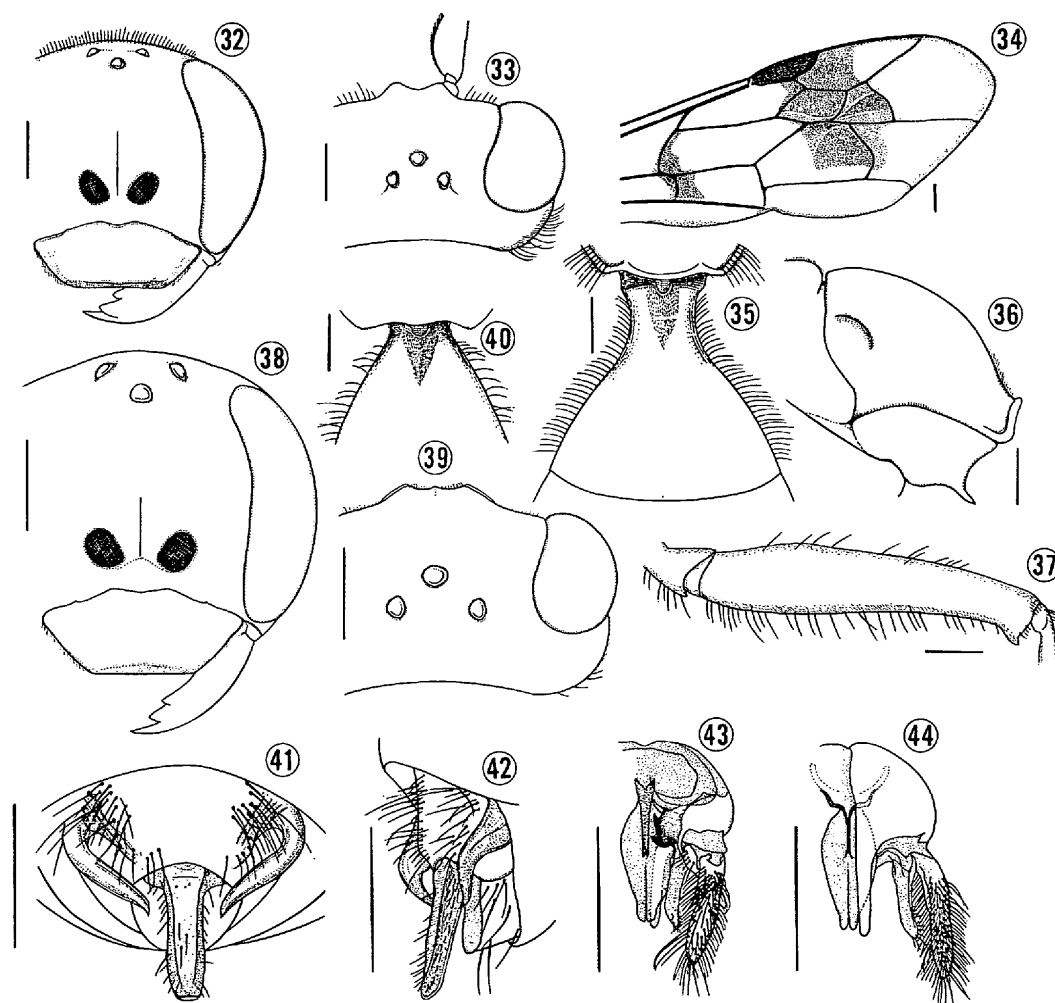
This species is distinguished from the preceding two species by the posterolaterally rugulose propodeum in both sexes. A weak inner band of the forewing (Fig. 34), a very narrow apical rim and a

rounded glabrous preapical ridge of the clypeus (Fig. 47), a distinct petiole of the tergum I (Fig. 35) and long white hairs covering the greater part of the body in the female, and the posteriorly prolonged rod-shaped subgenital plate (Figs. 41, 42) in the male are also important features of this species.

Female (holotype measurements in parentheses). Body length: 7.9-11.7 (11.0) mm; forewing length: 7.7-10.4 (10.2) mm.

Body and legs black; polished, especially metasoma strongly lustrous; apical portion of mandible, lateral and posterior margins of metasomal terga, posterior margins of metasomal sterna and apices of fore tarsomeres I-IV ferruginous; basal half of fore tibial spur pale brown; anteroventral face of flagellum often light brown; beard dark brown.

Wings hyaline. Forewing (Fig. 34) with two fuscous bands; inner band weak, scarcely extending ba-



Figs. 32-44. *Dipogon albithrix* sp. nov. (32-37, holotype ♀; 38-44, paratype ♂ from Fukui Pref., Honshu). — 32, 33, 38, 39, head (32, 38, frontal view; 33, 39, dorsal view); 34, forewing; 35, 40, metasomal tergum I, dorsal view; 36, propodeum, lateral view; 37, hind femur, outer view; 41, 42, apical metasomal segments (41, ventral view; 42, ventrolateral view); 43, 44, genitalia (43, ventral view; 44, dorsal view). Scales: 0.5 mm.

sally beyond vein M, posteriorly beyond vein A and anteriorly beyond vein Rs+M; outer band occupying basal 1/2 of marginal cell, apical portion of SMC1, SMC2 and 3, apical 1/2 of discal 2 and basal portion of discal 3, not extending distally beyond crossvein 3 rs-m; outer wing margin very weakly infuscate; sub-apical area not light gray.

Frons with dense fine punctures. Dorsa of pro-, meso- and metanota with dense fine punctures, which are much sparser in median portions of mesoscutum and scutellum. Metanotum with several strong oblique striae laterally. Upper metapleuron finely striate and punctate; lower metapleuron finely punctate. Propodeum with irregularly spaced, dense, strong punctures; posterolateral portion strongly and transversely rugulose. Metasoma with irregularly spaced, very fine punctures, which are much weaker on tergum I than on the other terga.

Head and most part of mesosoma with long, white pubescence, which is most conspicuous on lower frons, clypeus, basal half of mandible, gena, lateral side of mesosoma and coxae; metasoma with short white pubescence. Body very hairy; clypeus, gena, pronotum, mesosomal pleura, mesosternum, propodeum, metasomal tergum I, lateral sides of terga II-III, sterna I-IV and coxae with long, erect, white hairs; vertex, scutellum, metanotum, metasomal terga IV-VI and sterna V-VI with long brown hairs. Fore femur below weakly hairy; mid and hind femora below abundantly with long, erect, white hairs (Fig. 37).

Head in frontal view 1.1-1.2 (1.2) × as wide as long (Fig. 32). Vertex gently convex between eye tops. Frons weakly raised just above antennal sockets (Fig. 33), with a fine median line obscure on its upper half. Antennocular line scarcely inclined from antennal base toward eye. Inner orbits moderately convergent above. UID : MID : LID = 7.4-7.9 : 10 : 9.3-9.9 (7.6 : 10 : 9.8). MID 0.56-0.63 (0.57) × head width. Ocelli

forming an obtuse triangle. POL : OOL = 1 : 0.72-1.1 (1 : 0.84). POL 1.8-2.3 (1.9) × as long as width of anterior ocellus. Clypeus slightly broader than LID, 2.4-2.7 (2.5) × as wide as long, convex medially; apical margin with a depressed impunctate rim, which is very narrow or sometimes inconspicuous medially and is not clearly delimited laterally; preapical ridge stronger than in *D. romankovae*, rounded and glabrous (Fig. 47). Malar space very narrow. Gena in dorsal view moderately developed (Fig. 33), in profile 0.7-0.9 (0.76) × eye width. Flagellomere I much longer than flagellomere II [flagellomeres I : II = 10 : 7.6-8.0 (10 : 7.6)]; flagellomere I 3.9-4.6 (4.2) × as long as thick and 0.74-0.87 (0.85) as long as UID.

Pronotum with shoulders slightly convex; anterior vertical declivity large, strongly polished; posterior portion slightly depressed in front of posterior margin, which is obtusely subangulate medially. Mesoscutum with posterolateral margin feebly raised. Postnotum 0.1 × or less as long as metanotum along midline, deeply sunk between metanotum and propodeum. Propodeum in profile (Fig. 36) more convex than in *D. romankovae*, with a very shallow median groove.

Metasomal tergum I with a distinct petiole, which is shorter than wide ($a < b$ in Fig. 6; Fig. 35).

Forewing (Fig. 34) with vein Rs strongly angulate at juncture with crossvein 2rs-m; crossvein 3rs-m slightly curved outwardly or nearly straight. SMC2 receiving crossvein 1m-cu near middle. SMC3 1.0-1.3 (1.2) × as long as SMC2 on vein M, narrowed on vein Rs by 0.32-0.55 (0.32) × its length on vein M, receiving crossvein 2m-cu at basal 0.18-0.34 (0.27). Crossvein cu-a originating at the point distal to the fork of vein M + CuA by 0.4 or more of its length. Hindwing crossvein rs-m slightly curved, oblique to vein M.

Mid tibia with several short spines on outer and dorsal faces. Hind tibia with weak, sparse spines on outer face and bristly white hairs on dorsal face.

Male (the following description is based on two



Figs. 45-47. Female clypeus of *Dipogon vechti* species-group. — 45, *D. romankovae* from Hokkaido (a, preapical ridge of clypeus; b, apical rim of clypeus); 46, *D. vechti* from Nagano Pref., Honshu; 47, *D. albithrix* sp. nov., holotype.

paratypes, one of which lacks antennae). Body length: 5.7–7.2 mm; forewing length: 5.6–7.6 mm.

Similar to the female. Black; head and mesosoma submat, metasoma polished; apical half of mandible orange-red or ferruginous; apical portions of femora, tibiae and fore tarsomeres I–IV, and tibial spurs more or less ferruginous to light brown.

Punctures on body much denser and stronger than in the female. Upper metapleuron strongly striate; lower metapleuron finely striate and punctate. Propodeum very strongly and densely punctate and finely reticulate and rugulose; lateral portion strongly rugulose.

Pubescence and hairs on body shorter and sparser than in the female. Pubescence on upper frons, vertex, mesosomal dorsum except postnotum, and metasoma brown; pubescence on the rest of body light gray. Hairs on vertex, dorsa of pro-, meso- and metanota except basal portion of tergum I brown; hairs on the rest of body light gray. Femora below with short sparse white hairs.

Head in frontal view $1.1\text{--}1.2\times$ as wide as long (Fig. 38). Antennocular line inclined from antennal base toward eye (Fig. 39). MID $0.59\text{--}0.62\times$ head width. UID: MID: LID = $8.1\text{--}8.5: 10: 9.0\text{--}9.3$. Ocelli forming an obtuse triangle. POL: OOL = $1: 0.76\text{--}0.79$. Clypeus $2.2\text{--}2.4\times$ as wide as long, strongly narrowed anteriorly, strongly convex medially, without a preapical ridge; apical margin not depressed. Gena in dorsal view moderately swollen (Fig. 39), $0.68\times$ eye width in profile. Flagellomeres II–XI more strongly serrate below than in *D. vechti*; flagellomeres I and II in a ratio of 1: 1; flagellomere I $2.4\times$ as long as thick, $0.53\times$ as long as UID.

Postnotum $0.1\text{--}0.2\times$ as long as metanotum along midline. Propodeum short, strongly convex.

Metasomal tergum I not petiolate basally (Fig. 40). Sternum VI with a few fine rugulae and long erect bristly hairs of unequal length close by each lateral hook; lateral hook very long and strongly incurved, broad at base, abruptly narrowed from middle and tapering to a slightly recurved sharp point (Figs. 41, 42); surface of hook smooth and strongly polished; posterior margin of sternum VI arcuately emarginate. Subgenital plate (Figs. 41, 42) narrow and rod-shaped, laterally compressed but broadly flattened along midline, extending beyond apex of tergum 7.

Genitalia (Figs. 43, 44): paramere covered with long dense setae; parapenial lobe extending slightly beyond apex of aedeagus, nearly straight; aedeagus broadest before middle, gradually narrowing toward apex.

Forewing SMC3 $1.1\text{--}1.2\times$ as long as SMC2 on vein M, narrowed on vein Rs by $0.35\text{--}0.48\times$ its length on vein M, receiving crossvein 2m-cu at basal $0.23\text{--}0.27$. Crossvein cu-a originating at the point slightly distal to the fork of vein M + CuA.

Holotype. ♀, "Hikawa, Okutama, Tokyo, x. 1952 leg. S. Tada". Deposited in the Department of Natural History, Tokyo Metropolitan University, Tokyo.

Paratypes. Hokkaido: 1♀, Hassenzawa nr Furano, ix-10, 1959 (R. Ishikawa); 1♀, Maruyama, Sapporo, ix-9, 1958 (T. Nambu); Honshu: 1♀, Itadome, Kuroishi-shi, Aomori Pref., viii-7, 1982 (M. Yamada); 1♀, Chôkeidaira, Hukaura-machi, Nishi-tsugaru-gun, Aomori Pref., vi-27, 1985 (M. Yamada); 2♀, Kôsei-rindô, Nishimeya-mura, Naka-tsugaru-gun, Aomori Pref., viii-10, 1985 (M. Yamada); 1♀, Kôsei-rindô, Azigasawa-machi, Nishi-tsugaru-gun, Aomori Pref., ix-8, 1985 (M. Yamada); 1♀, Nagashita, Gonohe-machi, Sannohe-gun, Aomori Pref., vi-28, 1986 (M. Yamada); 1♀, Korakumae, Ikarigaseki, Minami-tsugaru-gun, Aomori Pref., x-13, 1990 (M. Yamada); 1♀, Natusaka, Takko-machi, Sannohe-gun, Aomori Pref., vii-20, 1986 (M. Yamada); 1♀, Yoshida, Jôbôji-machi, Ninohe-gun, Iwate Pref., viii-10, 2000 (H. Takahashi); 1♀, Hara, Kawasaki-cho, Miyagi Pref., x-31, 1982 (K. Goukon); 1♀, Yumoto, Nikko, Tochigi Pref., vii-10, 1981 (K. Kubota); 1♀, Tsuchiyu-onsen, Fukushima-shi, Fukushima Pref., viii-11, 2000 (H. Takahashi); 1♀, Yoshida-machi, Chichibu-gun, Saitama Pref., ix-30, 1972 (T. Nambu); 1♀, Urayama, Chichibu-shi, Saitama Pref., v-26, 1973 (T. Nambu); 1♀, Yokosawairi, Akiruno-shi, Tokyo, x-19, 1996 (H. Takahashi); 1♀, same locality, x-1, 1997 (H. Takahashi); 1♀, same locality, x-19, 1997 (H. Takahashi); 1♀, Asakawa, Hachioji-shi, Tokyo (R. Ishikawa); 1♀, Kasei, Tsuru-shi, Yamanashi Pref., x-23, 1996 (H. Takahashi); 1♀, Hirasawa, Ina-shi, Nagano Pref., ix-19, 1978 (M. Arima); 1♀, Mt. Minamisawa-yama, Ina-shi, Nagano Pref., ix-19, 1978 (A. Shimizu); 1♀, Ohsugidani, Shiramine-mura, Ishikawa-gun, Ishikawa Pref., ix-1, 1991 (I. Togashi); 1♀, Taniyama, Ôno-shi, Fukui Pref., ix-5, 1976 (H. Kurokawa); 1♀, same locality, iv-18, 1982 (C. Nozaka); 1♂, Mt. Akasagi, Ôno-shi, Fukui Pref., viii-19, 1979 (T. Murota); 1♀, Kyôgatake, Katsuyama-shi, Fukui Pref., vii-22, 1973 (T. Murota); 1♀, 650 m, Decid. forest, Yawata, Asahi, Aichi Pref., vii-18–28, 1998 (M. Ozawa); 1♀, 900 m, Beech forest, Uradani, Shitara, Aichi Pref., viii-1–7, 1994 (T. Kanbe); Kyushu: 1♂, Yaku-shima Is., Kagoshima Pref., iii-30, 1987, Em. vi-11–20, 1987 (H. Makihara). All paratypes are deposited in the Department of Natural History, Tokyo Metropolitan

University, Tokyo, except for the last specimen deposited in the Insect Collection of the National Institute of Agro-Environmental Sciences, Tsukuba.

Etymology. The specific name is derived from abundant long erect white hairs on the body and legs; albi- (white) + thrix (hair).

Dipogon granulifrons species-group

This group is distinguished from the other species-groups of Japanese *Deuteragenia* by the finely shagreened frons and numerous, long, erect, dark brown hairs on the upper frons and vertex in the female (Figs. 48, 49, 54, 55).

Female. Spines on outer face of hind tibia rudimentary. Propodeum very densely punctate, bearing short, sparse, light gray hairs in posterolateral portions. Metasomal tergum I with a distinct petiole shorter than wide ($a < b$ in Fig. 6; Fig. 52); tergum I lacking long erect hairs. Tarsal claws with a tooth near apex. Arolia large.

Male. Unknown.

Dipogon granulifrons sp. nov.

[Japanese name: Samehada-hige-bekkō]

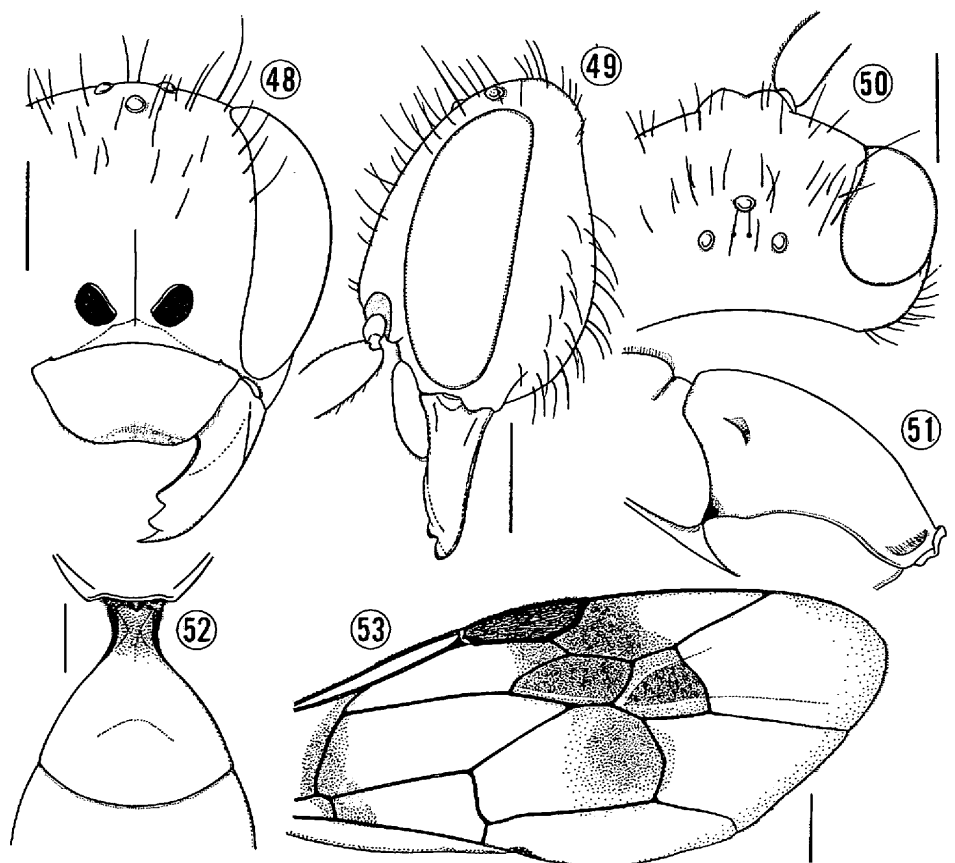
(Figs. 48–53)

Female (holotype measurements in parentheses). Body length: 7.7–9.2 (7.7) mm; forewing length: 6.8–7.5 (7.2) mm.

Black; head and mesosoma mat; metasoma weakly polished; apical portion of mandible, underside of flagellum, posterolateral margin of metanotum, lateral and posterior margins of metasomal terga, posterior margins of metasomal sterna and apices of fore tarsomeres I–IV ferruginous; maxillary cardo pale brown; beard light to dark brown.

Wings hyaline. Forewing (Fig. 53) with two fuscous bands; inner band weak, barely attaining vein $Sc + R + Rs$; outer band occupying basal 1/2 of marginal cell, apical portion of SMC1, SMC2 and 3 and apical 1/2 of discal 2, not extending distally beyond cross-vein 3rs-m; outer wing margin very weakly infuscate; subapical portion not light gray.

Dorsa of pro-, meso- and metanota finely punctate, interspace of punctures on mesoscutum and scutellum



Figs. 48–53. *Dipogon granulifrons* sp. nov., holotype ♀. — 48–50, head (48, frontal view; 49, lateral view; 50, dorsal view); 51, propodeum, lateral view; 52, tergum I, dorsal view; 53, forewing. Scales: 0.5 mm.

alutaceous. Metanotum with a few strong oblique striae laterally. Postnotum smooth and impunctate medially. Upper metapleuron finely and regularly striate; lower metapleuron finely tessellate. Propodeum with lateral and posterior portions finely striate. Metasoma densely micropunctate.

Upper frons, vertex and dorsa of pro-, meso- and metanota with pale brown pubescence; the rest of body and appendages covered with conspicuous light gray decumbent pubescence, which gives metasoma a pruinose appearance in certain light. Upper frons and vertex with numerous, dark brown, erect hairs, which are more than $0.5\times$ as long as the longest hair on each side of vertex by inner orbit (Figs. 48, 49). Dorsa of pro- and mesonota sparsely with brown, erect hairs; shoulder densely with hairs. Gena, pro- and mesopleura, mesosternum, lateral side of propodeum and coxae with light gray hairs; gena, propleuron and fore coxa with longer and denser hairs. Metasomal terga IV–VI with long, dark brown, erect hairs, very dense on tergum VI. Metasomal sterna II–VI with sparse fulvous hairs, which become longer and darker toward apex. Femora below with very short and sparse light gray hairs.

Head in frontal view $1.1\times$ as wide as long (Fig. 48). Vertex gently convex between eye tops. Frons gently convex in profile (Fig. 49), broad, compared with eye in frontal view, with a median line very finely and shallowly impressed below; MID $0.63\times$ head width. Antennocular line strongly inclined from antennal base toward eye (Fig. 50). Inner orbits arcuate, gently convergent above and below. UID : MID : LID = 7.6–7.9 : 10 : 8.8–9.1 (7.9 : 10 : 9.1). Ocellar triangle acute (holotype) or rectangular. POL : OOL = 1 : 0.97–1.2 (1 : 1.2). POL $1.7\text{--}2.0$ ($1.7\times$) as long as width of anterior ocellus. Clypeus as wide as LID, $2.3\times$ as wide as long, strongly narrowed anteriorly, gently convex medially; apical margin feebly emarginate, not depressed but subpolished. Malar space narrow. Gena moderately developed (Fig. 50), about 0.8 ($0.76\times$) eye width in profile. Scape, flagellomere I and flagellomere II in a ratio of 8.2–8.3 : 10 : 9.1–9.4 (8.2 : 10 : 9.1); flagellomere I $3.9\text{--}4.2$ ($4.2\times$) as long as thick, $0.74\text{--}0.75$ ($0.75\times$) as long as UID.

Pronotum with shoulders slightly convex; posterior portion very shallowly depressed in front of posterior margin, which is obtusely subangulate medially. Mesoscutum with posterolateral margin slightly reflexed. Postnotum narrow and deeply depressed medially, $0.1\text{--}0.2$ ($0.19\times$) as long as metanotum along midline. Propodeum gently convex in profile (Fig. 51); median groove shallow and inconspicuous.

Metasomal sternum VI sharply carinate.

Forewing vein Rs with 4th abscissa that is as long as or longer than 5th abscissa (Fig. 53). Crossvein 3rs-m slightly curved outwardly. SMC2 elongate by inclination of 4th abscissa of vein Rs, receiving crossvein 1m-cu slightly beyond middle. SMC3 $1.0\text{--}1.1$ ($1.1\times$) as long as SMC2 on vein M, narrowed on vein Rs by $0.40\text{--}0.50$ ($0.44\times$) its length on vein M, receiving crossvein 2m-cu at basal $0.26\text{--}0.30$ (0.29). Crossvein cu-a originating at the point slightly distal to the fork of vein M+CuA.

Mid tibia with several very short spines on outer face. Hind tibia with a few, rudimentary spines on outer face and several short white hairs on dorsal face.

Holotype. ♀, "Oze marsh, Gunma Pref., vii-25, 1963 K. Sugiyama leg." Deposited in the Department of Natural History, Tokyo Metropolitan University, Tokyo.

Paratypes. 1♀, Oze marsh, Gunma Pref., vii-25, 1963 (K. Sugiyama); 1♀, Marunuma, Katashinamura, Tone-gun, Gunma Pref., viii-17, 1963 (Y. Haneda). Deposited in the Department of Natural History, Tokyo Metropolitan University, Tokyo.

Etymology. The specific name is derived from the finely granulated frons of this species.

Dipogon carychroceraeus sp. nov.

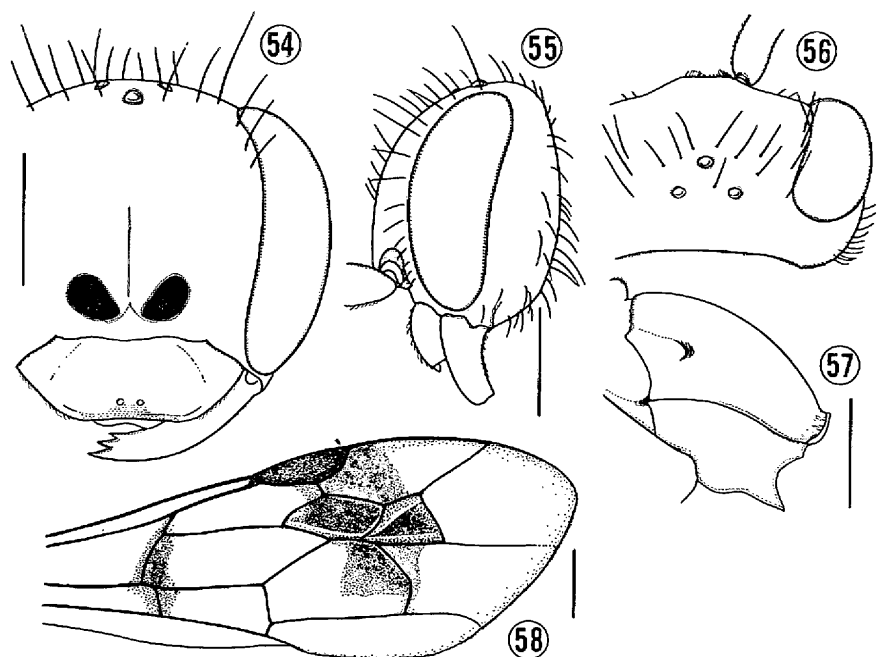
[Japanese name: Ko-samehada-hige-bekko] (Figs. 54–58)

This species is very similar to *D. granulifrons*, but is distinguished from the latter by the flagellomere I shorter, approximately as long as the scape or flagellomere II, and the flagellum largely light brown below in the female.

Female (holotype measurements in parentheses). Body length: 4.8–8.0 (6.0) mm; forewing length: 4.6–7.2 (5.3) mm.

Coloration similar to that of *D. granulifrons*; flagellum largely light brown ventrally, darker dorsally. Punctuation and pilosity on body very similar to those of *D. granulifrons*.

Head in frontal view $1.1\text{--}1.2$ ($1.2\times$) as wide as long (Fig. 54). Frons in profile usually more convex than in *D. granulifrons* (Fig. 55); median line finely impressed below. UID : MID : LID = 7.3–8.1 : 10 : 8.2–8.9 (7.7 : 10 : 8.5). MID $0.60\text{--}0.66$ ($0.63\times$) head width. Ocellar triangle acute but near rectangular. POL : OOL = 1 : 0.98–1.6 (1 : 1.2). POL $1.6\text{--}1.9$ ($1.9\times$) as long as width of anterior ocellus. Clypeus $2.2\text{--}2.6$ ($2.5\times$) as wide as long; apical margin nearly straight, not depressed but alutaceous. Gena in dorsal



Figs. 54–58. *Dipogon carychroceraeus* sp. nov., holotype ♀. 54–56 head (54, frontal view; 55, lateral view; 56, dorsal view); 57, propodeum, lateral view; 58, forewing. Scales: 0.5 mm.

view moderately developed (Fig. 56), 0.7–0.9 (0.75) \times eye width in profile. Flagellomere I shorter than in *D. granulifrons*, approximately as long as scape and flagellomere II; scape, flagellomere I and flagellomere II in a ratio of 8.9–10 : 10 : 9.3–10 (9.5 : 10 : 9.5); flagellomere I 2.9–3.6 (3.2) \times as long as thick, 0.53–0.70 (0.61) \times as long as UID.

Mesoscutum with posterolateral margin barely reflexed. Postnotum 0.1–0.2 (0.1) \times as long as meta-notum along midline. Propodeum shorter and more convex than in *D. granulifrons* (Fig. 57); median groove obsolete.

Metasomal tergum I with a distinct petiole as in *D. granulifrons*.

Venation much as in *D. granulifrons* (Fig. 58). SMC2 elongate as in *D. granulifrons*, but 4th abscissa of vein Rs as long as or shorter than 5th. SMC3 0.90–1.3 (1.1) \times as long as SMC2 on vein M, narrowed on vein Rs by 0.42–0.53 (0.45) \times its length on vein M, receiving crossvein 2m-cu at basal 0.17–0.36 (0.17).

Mid tibia more spinose than in *D. granulifrons*.

Holotype. ♀, “Hassenzawa nr Furano, Hokkaido ix-10, 1959 R. Ishikawa”. Deposited in the Department of Natural History, Tokyo Metropolitan University, Tokyo.

Paratypes. Hokkaido: 1♀, Rausu, viii-27, 1989 (K. Goukon); 1♀, Hiroo, Tokachi, x-4, 1968 (M. Miyatake); 1♀, Sapporo, ix-3, 1958 (S. Uéda); 1♀, Moiwa, Sapporo, vii-19, 1959 (T. Nambu); Honshu: 1♀, Fukutami, Kuroishi-shi, Aomori Pref., vi-29, 1994 (M.

Yamada); 1♀, Yayoikuma, Hirosaki-shi, Aomori Pref., vii-18, 1996 (M. Yamada); 1♀, Yayoikuma, Iwaki-machi, Nakatsugaru-gun, Aomori Pref., ix-10, 1996 (M. Yamada); 1♀, Ichinowatari, Hirosaki-shi, Aomori Pref., vii-28, 1990 (M. Yamada); 1♀, Zatoishi, Hirosaki-shi, Aomori Pref., x-4, 1997 (M. Yamada); 1♀, Aone, Mt. Zao, Miyagi Pref., vii-18, 1980 (K. Kojima & T. Nishioka); 1♀, Nokado, Kuriyama, Tochigi Pref., ix-12, 1981 (K. Nakamura); 1♀, Nagakubo, Ogano-machi, Chichibu-gun, Saitama Pref., viii-17, 1992 (A. Shimizu); 1♀, Mt. Mitake, Oume-shi, Tokyo, vii-18, 1991 (H. Takahashi); 1♀, Kazuma, Hinohara-mura, Nishitama-gun, Tokyo, ix-11, 1999 (I. Dohzono); 1♀, Lake Yamanaka-ko, Yamanashi Pref., vii-25, 1953 (D. Yamamoto); 1♀, Minamisawayama, Ina-shi, Nagano Pref., ix-18–21, 1978 (A. Shimizu); 1♀, Jpn. cedar, Ohkuwa, Suhara, Nagano Pref., ix-1–7, 1996 (Y. Jishage); 1♀, Taniyama, Shimouchinami, Ôno-shi, Fukui Pref., ix-28, 2001 (H. Takahashi). Deposited in the Department of Natural History, Tokyo Metropolitan University, Tokyo.

Etymology. The specific name is derived from the flagellum largely light brown below; carychro- (walnut color) + ceraeus (horned).

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References

- Day, M. C. 1979. Nomenclatural studies on the British Pompilidae (Hymenoptera). *Bulletin of the British Museum (Natural History), Entomological series*, 38: 1-26.
- Day, M. C. 1988. Spider wasps, Hymenoptera, Pompilidae. *Handbooks for the Identification of British Insects*, 6: 1-60.
- Evans, H. E. 1974. A review of the species of *Dipogon* occurring in Central America, Mexico, and extreme southwestern United States (Hymenoptera, Pompilidae). *Transactions of the American Entomological Society*, 100: 29-51.
- Lelej, A. S. 1986. Spider wasps of genera *Dipogon* Fox and *Poecilageniella* Ishikawa (Hymenoptera, Pompilidae) of the Far East. *Revue d'Entomologie de l'URSS*, 65: 799-808. (In Russian.)
- Shimizu, A. & Ishikawa, R. 2002. Taxonomic studies on the Pompilidae occurring in Japan north of the Ryukyus: Genus *Dipogon*, subgenus *Deuteragenia* (Hymenoptera) (Part 1). *Entomological Science*, 5: 219-235.
- Townes, H. 1957. Nearctic wasps of the subfamilies Pepsinae and Ceropalinae. *Bulletin of the United States National Museum*, 209: 1-286, pls. 1-4.
- Wahis, R. 1974. Données pour un Atlas des Hyménoptères de l'Europe occidentale Pompilides du genre *Dipogon* Fox 1887, sous-genre *Deuteragenia* Šustera 1912 (Pompilidae, Pepsinae). *Bulletin des recherches agronomiques de Gembloux*, 7: 333-349.
- Wolf, H. 1964. Die nord- und mitteleuropäischen Arten der Gattung *Dipogon* Fox 1897, Untergattung *Deuteragenia* Šustera 1912 und der Gattung *Pompilus* Fabricius 1798, Untergattung *Arachnospila* Kincaid 1900 (Hym. Pompilidae). *Opuscula Entomologica*, 29: 4-30.
- Wolf, H. 1972. *Insecta Helvetica. Fauna 5. Hymenoptera Pompilidae*. Fotorotar, Zürich.

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