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Systematic and biological studies of the family Andrenidae of Japan (Hymenoptera, Apoidea)
Part 2. Systematics, 2*

Yoshihiro HIRASHIMA

2. Subgenus *Calomelissa* Hirashima et LaBerge, nov.

καλος, beautiful and μελισσα, bee.

Type-species: *Andrena prostomias* Pérez, 1905.

Diagnosis: This new subgenus is readily recognizable by the large enclosure of the propodeum which is much more coarsely sculptured than the dorsal face of the propodeum. The dorsal face of the propodeum is finely tessellate and very weakly punctate. The mesopleuron is finely tessellate with weak and sparse punctures. Thus, the propodeum and the mesopleuron are scarcely roughened in this subgenus. So far as known, these characters seem to be unusual for *Andrena*. The subgenus is further made distinct by the yellow clypeus of the male, and the large facial fovea, the scanty propodeal corbicula, the imperfect trochanteral floccus and the dense tibial scopa of the female. The subgenus is readily distinguished from *Charitandrena* in having the normal posterior spurs of the hind tibiae (widened and curved near base in *Charitandrena*). The hairs of the femoral floccus and the tibial scopa are simple in *Calomelissa*, while they are branched in *Charitandrena*.

Description: Medium-sized to large species; integument black. Head subquadrate or more or less rounded in front view, facial quadrangle longer than broad; malar space almost obsolescent; clypeus nearly flat or slightly convex; inner eye margins subparallel; cheeks unusually well developed in type species. Thorax with blackish pubescence; dorsal face of propodeum weakly tessellate with weak punctures; enclosure of propodeum usually large, with sides convex outwardly, coarsely sculptured, unusually depressed medially in the type-species; mesopleuron weakly tessellate with weak and sparse punctures, not at all roughened. Wings with three submarginal cells; 2nd submarginal cell receiving 1st recurrent vein beyond middle or near end of cell; basal vein interstitial or distad of nervulus. First metasomal tergum smooth, shiny, impunctate or with microscopic punctures; 2nd and 3rd metasomal terga nearly smooth, with sparse and very weak punctures; posterior depressions of metasomal terga rather broad, not well indicated.

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Female: Facial fovea very broad, upper end occupying full space between eye and post ocellus, lower end reaching upper margin of clypeus, separated from eye margin by a narrow raised line; process of labrum variable; antennae with 3rd segment as long as or slightly longer than 4th plus 5th. Propodeal corbicula not well developed, with dorsal fringe of short, scanty, branched hairs; interior of corbicula with short, rather sparse, simple hairs; trochanteral floccus imperfect, short, scanty; femoral floccus dense, composed of simple hairs; tibial scopa compact, composed of dense, rather long, well arranged, simple hairs. Mid basitarsi not distinctly expanded medially, subequal to hind basitarsi in width; posterior spur of hind tibia normal. Posterior margins of 2nd to 4th metasomal terga with sparse hair fringes.

Male: Clypeus entirely or broadly yellow medially; mandibles without special modification; process of labrum variable; antennae with 3rd segment slightly less than twice as long as broad, shorter than following two segments together; cheeks variable, well developed in type-species. Metasoma as strongly punctate as in female or a little more strongly so, with an indication of sparse hair fringes. Genitalia oblong in dorsal view, with parapenial lobe robust, produced and sharp apically; paramere slightly expanded apically, with sharp inner edges; sagitta more or less small, with sides deeply emarginate.

Species included: So far as the present paper is concerned, the subgenus is divided into two groups. They are the *prostomias*-group and the *mitakensis*-group. The above description of the subgenus is presented primarily for the *prostomias*-group. The *mitakensis*-group deviates from the *prostomias*-group by having the facial fovea much narrower, the propodeal enclosure smaller with the sides not convex outwardly, the tibial scopa composed of more loose hairs, etc.

The *mitakensis*-group may represent a separate subgenus, but it is provisionally included in *Calomelissa* in this paper. Hedicke (1933) suggested that *Andrena coitana* (Kirby) and its allied species may represent a distinct subgenus which is placed near to *Notandrena* Pérez. *Andrena coitana* is, in our opinion, probably a member of *mitakensis*-group.

A. Group of *prostomias*.

(14) *Andrena* (*Calomelissa*) *prostomias* Pérez

Andrena prostomias Pérez, 1905, Bull. Mus. d'Hist. Nat. Paris, 1905: 34, female; Cockerell, 1913, Ann. Mat. nat. Hist., (8) 11: 189, female; Yasumatsu, 1941, Peking Nat. Hist. Bull., 15: 279.

This is a very striking species and the recognition of it is very easy. The female of this species can readily recognizable by its large size, the massive head which is quadrate in front view, the nearly flat and apically reflected clypeus, the large facial fovea, etc. The male is smaller and much slenderer than the female, having the clypeus tinged with yellow medially. This and the following species, *Andrena tsukubana* Hirashima, are characterized by the propodeum and the mesopleuron not at all roughened as indicated in the description of the subgenus. This character is quite unique for the species of *Andrena*. Thus, they form a distinct group which, so far as the present knowledge is concerned, is only found in Japan.

This species flies from late May to mid June, and appears once a year. It primarily associates with the flowers of *Deutzia crenata*.

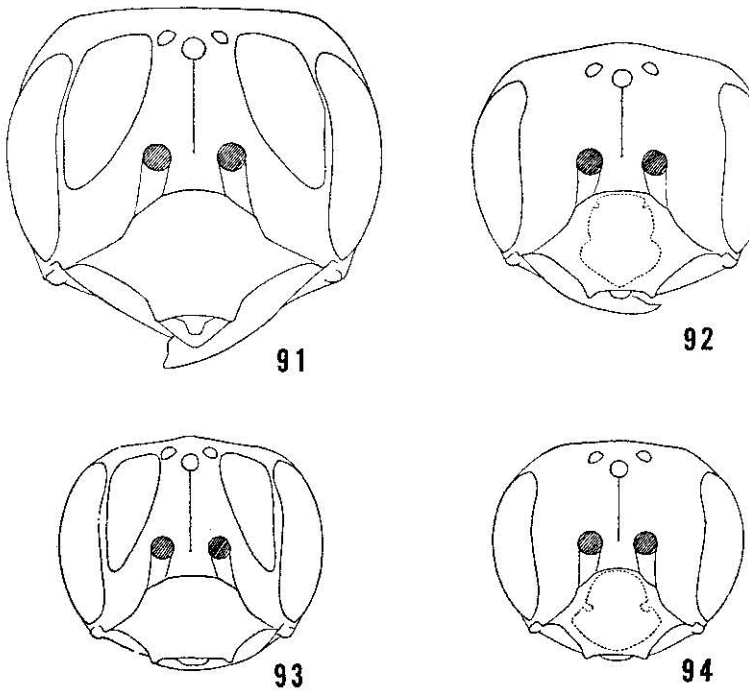
Female: Length 12–13 mm.

Colour: Mandibles broadly reddened apically; basal tubercles of mandibles reddened; occasionally clypeus and lower paraocular areas piceous; flagellum reddish brown beneath; wings distinctly brownish, with stigma deep brown, veins brown; tegulae deep reddish brown; legs piceous with tibiae and tarsi more reddened; metasoma piceous basally; posterior margins of metasomal terga narrowly yellowish transparent.

Pubescence: Hairs on head short, suberect to erect, sparse on clypeus, slightly more dense elsewhere, brownish except for paler hairs on antennal regions and occiput; facial fovea chocolate, paler below, covered with very short, appressed, bright hairs and with short, erect to suberect, rather dense, brownish hairs; hairs on mesoscutum short, suberect, rather dense, fuscous; hairs on scutellum short, fuscous, longer and paler posteriorly; propodeum scanty of hairs dorsally; dorsal fringe of propodeal corbicula rather scanty, composed of rather short, not well arranged, white hairs; interior of corbicula with sparse, fine, simple hairs; mesopleuron with rather short, not dense, dull white hairs; trochanteral floccus imperfect, scanty, white; femoral floccus dense, silvery white; tibial scopa well developed, composed of dense, well arranged, simple hairs; tibial scopa silvery white, narrowly and slightly brownish above basally; disc of 1st tergum almost bare; cilia on 2nd and following terga brownish; caudal fimbria fuscous; posterior margins of 2nd tergum with lateral, that of 3rd with more broad, that of 4th with nearly complete fringes of short, appressed, white hairs; fringe of 4th tergum sparser than that of 3rd; hairs on metasomal sterna whitish, those on 5th and 6th sterna slightly brownish.

Structure: Head large, nearly quadrate in front view; inner margins of orbits slightly convergent above; mandibles long, robust basally, rather slender apically; malar space very narrow, about one-eight as broad as base of mandibles; process of labrum small, subprotuberant; clypeus convex above, scarcely or very slightly so subapically, reflected at apex, smooth, strongly shiny, scattered with distinct punctures; supraclypeal area elevated as high as base of clypeus, smooth; facial fovea separated from eye margin by a narrow space, very large, with upper end occupying full space between orbits and post ocelli; antennae with 3rd segment longer than 4th plus 5th which are slightly broader than long respectively; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is 2 : 3 : 3 : 7; occasionally postocellar distance shorter than ocelloccipital distance; vertex weakly tessellate, rather weakly and not densely punctate; cheeks well developed, more than one and one-half times as broad as eyes seen in profile, convex, weakly tessellate, weakly and sparsely punctate. Mesoscutum narrowly nearly shagreened anteriorly, broadly weakly tessellate or sometimes nearly smooth medially, slightly shiny, weakly and rather sparsely punctate with punctures distinctly weaker than those on clypeus; mesoscutellum slightly convex, primarily more smooth than mesoscutum; dorsal face of propodeum scarcely roughened, densely nearly tessellate with an indication of very weak, rather dense punctures, nearly dull basally, feebly shiny apically; enclosure large with lateral margins convex outwardly, interior more or less roundly concave medially, coarsely rugose basally, densely tessellate

apically; apical portion of enclosure broadly and vertically extending down onto posterior face of propodeum; mesopleuron hardly roughened, tessellate, sparsely and more or less weakly punctate with punctures a little stronger than those on mesoscutum and a little weaker than those on clypeus. Wings with 2nd submarginal cell receiving 1st recurrent vein beyond middle or near end of cell; basal vein interstitial with or slightly distad of nervulus. Legs with mid basitarsi hardly expanded medially, a little narrower than hind basitarsi. Metasoma broad; 1st tergum smooth, strongly shiny, scattered with microscopical fine punctures; 2nd smooth, less shiny than 1st, with punctures microscopical, much denser than those on 1st; 3rd and 4th nearly smooth, more densely punctate than in 2nd; posterior depressions of terga broad, not sharply indicated.



Figs. 91–94. Front view of head of *Andrena* (*Calomelissa*).
Figs. 91–92: *prostomias* Pérez, 91: female, 92: male;
figs. 93–94: *tsukubana* Hirashima, 93: female, 94: male.

Male (New to science): Length 10–11 mm.

Colour: Black; clypeus broadly and longitudinally yellow medially; mandibles reddened apically; flagellum reddish brown beneath; wings distinctly brownish, stigma and veins brown; tegulae brown subhyaline; legs piceous with small segments of tarsi brownish; metasoma obscurely piceous; posterior margins of metasomal terga narrowly yellowish transparent.

Pubescence: Hairs on head sparse, rather short (on clypeus) to more or less long (on sides of face and on vertex), suberect to erect, nearly brown except for

paler hairs on antennal regions, occiput and cheeks below; hairs on thorax not specially dense, more or less short above; hairs on mesoscutum and mesoscutellum predominantly brown, those on metanotum, propodeum and mesopleuron whitish to white; metasomal terga scanty of hairs; cilia on 2nd and following terga brownish; hairs on 5th and 6th terga nearly brown; posterior margins of 2nd to 4th terga with lateral fringes of short, rather sparse, white hairs.

Structure: Head large, but not distinctly broader than thorax seen from above, somewhat quadrate in front view; mandibles not specially long, more or less slender; malar space a little narrower than in female, approximately linear; process of labrum rather small, protuberant; clypeus very slightly convex, reflected at apex, smooth, strongly shiny, scattered with rather distinct punctures; supraclypeal area smooth, elevated as high as base of clypeus; antennae with 3rd segment a little more than one and one-half times as long as broad, 4th segment a little broader than long, 5th and following segments indistinctly longer than broad respectively; frons weakly longitudinally striate, with an indication of roughened punctures; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is about 1.5: 2.8: 2.8: 5.5; vertex shiny, somewhat coarsely punctate; cheeks well developed, much broader than large eyes, tessellate with weak punctures. Mesoscutum narrowly shagreened anteriorly, nearly smooth medially, sparsely and weakly punctate with punctures a little weaker than those on clypeus; mesoscutellum well convex, nearly smooth with weak punctures; propodeum and mesopleuron sculptured quite as in female, not at all more roughened than in female. Wings nearly as in female. Legs slender, as usual. Metasomal terga smooth or nearly so, shiny; 1st tergum with sparse, 2nd and following terga with more dense, very weak punctures; posterior depressions of 2nd to 5th terga more or less broad, not well indicated. Genitalia and subgenital sterna as illustrated.

Distribution: Japan (Honshu and Kyushu).

Specimens examined: A series of specimens, including the alotype male (Hikosan, Kyushu, 5. vi. 1927, Hori and Fujino leg.), from various localities in Honshu and Kyushu was examined.

Flower record: *Deutzia crenata* Sieb. et Zucc.

(15) *Andrena* (*Calomelissa*) *tsukubana* Hirashima

Andrena tsukubana Hirashima, 1957, Mushi, 30 (9): 55, female and male.

This species is a close relative of *Andrena prostomias* Pérez but can be readily separated from it primarily by the smaller size and the normally convex clypeus in both sexes. The head is not so massive as it is in *prostomias*, and the propodeal enclosure is not concaved medially.

This species also associates with the flowers of *Deutzia crenata*, and has been commonly found in Honshu and Kyushu.

The redescriptions of the structures, based upon the holo- and allotype respectively, are given below.

Female: Length about 11 mm., extention of wings 19.5 mm.

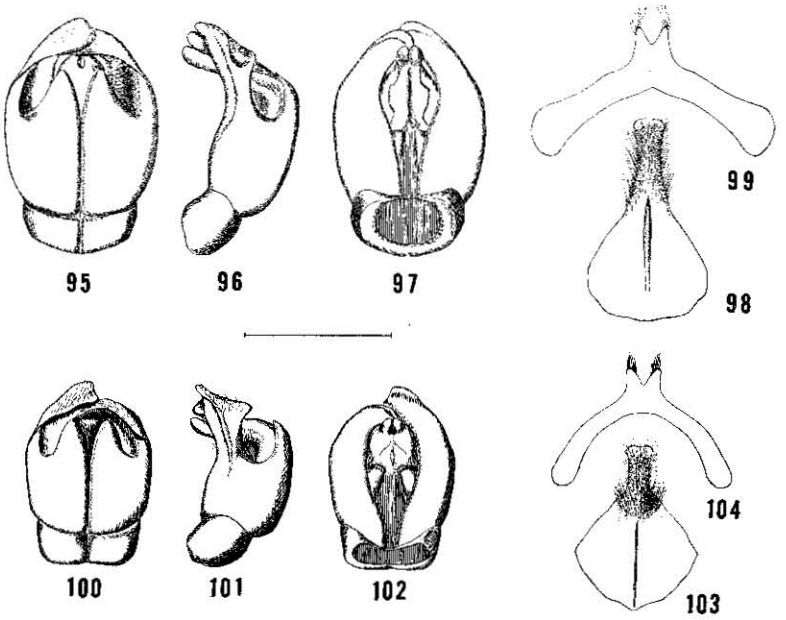
Head rather small, narrower than thorax seen from above, somewhat quadrate in front view; mandibles moderately long, robust; malar space about one-fifth

time as long as base of mandible; process of labrum large, transverse, apex entire; clypeus well convex, nearly smooth, shiny, scattered with rather coarse punctures; clypeus slightly exceeding line running bases of eyes, its index 1.4 : 2.0; facial quadrangle longer than broad (8.5 : 6.8); lower paraocular areas nearly smooth, shiny, sparsely punctate with punctures much weaker than those on clypeus; antennae with 3rd segment a little longer than 4th plus 5th which are broader than long respectively; frons longitudinally weakly striate, with an indication of weak punctures; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocelloccular distance is 1.8 : 1.7 : 3.0 : 5.2; vertex tessellate, weakly and sparsely punctate; facial fovea separated from eye by a very narrow raised space, with upper end occupying full space between orbits and posterior ocelli, obliquely narrowing downwards; cheeks about as broad as eyes seen in profile, convex above, receding below, weakly punctate. Mesoscutum densely tessellate anteriorly, weakly so posteriorly, weakly shiny, weakly and sparsely punctate with punctures weaker than those on lower paraocular areas; scutellum slightly convex, smoother and a little more densely punctate than in mesoscutum; propodeum scarcely roughened, densely tessellate basally and weakly so anteriorly, densely and very weakly punctate; enclosure large with lateral margins convex outwardly, densely rugose; apical portion of enclosure nearly shagreened, vertically extending onto posterior face of propodeum; lateral face of propodeum finely tessellate; mesopleuron scarcely roughened, weakly tessellate, weakly shiny, weakly and rather sparsely punctate with punctures a little stronger than those on mesoscutum. Wings with 2nd submarginal cell oblique, receiving 1st recurrent vein near end of cell; basal vein almost interstitial with nervulus. Legs with mid basitarsi scarcely expanded medially, slightly narrower than hind basitarsi. Metasoma broad, shiny; 1st tergum smooth, impunctate basally, sparsely and very weakly punctate elsewhere; 2nd tergum very weakly tessellate basally, the rest of tergum nearly smooth, very weakly and distinctly more densely punctate than in 1st; 3rd and 4th terga very weakly tessellate, punctate nearly as in 2nd; posterior depressions of 2nd to 4th more or less well indicated, sparsely and very weakly punctate.

Male: Length a little over 10 mm.

Head rather small, slightly narrower than thorax seen from above, more or less round in front view with vertex only slightly arched; mandibles moderately long, robust; malar space narrower than in female, not linear but hardly noticeable; process of labrum transverse, convex apically; clypeus rather well convex, smooth, shiny, scattered with distinct punctures; clypeus slightly exceeding line running bases of eyes, its index 2 : 1; facial quadrangle longer than broad (8.1 : 6.4); lower paraocular areas nearly smooth, shiny, sparsely punctate with punctures weaker and slightly denser than those on clypeus; antennae long, with 3rd segment twice as long as broad, 4th indistinctly broader than long, 5th and following segments slightly longer than wide; frons weakly striate-punctate; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is 1.5 : 1.7 : 3.0 : 5.1; vertex densely nearly tessellate with more or less roughened punctures; cheeks about as broad as eyes seen in profile, convex above, receding below, tessellate posteriorly, nearly smooth near eyes, weakly punctate. Mesoscutum densely tessellate anteriorly, nearly smooth and much more shiny posteriorly, weakly and sparsely punctate with punctures weaker than those on lower paraocular areas; mesoscutum well convex, shiny.

rather densely punctate with punctures a little more weaker than those on mesoscutum; propodeum and mesopleuron scarcely roughened, about as coarsely sculptured as in female; enclosure of propodeum nearly as in female or with rugae a little weaker. Wings with 2nd submarginal cell receiving 1st recurrent vein near middle of cell; basal vein interstitial with nervulus. Legs slender, as usual. Metasoma elongate, smooth or nearly so, shiny; 1st tergum sparsely, 2nd and following terga more densely punctate with punctures very weak, about as strong as or slightly weaker than those on scutellum; posterior depressions of terga rather narrow, more or less well indicated. Genitalia and subgenital sterna as illustrated.



Figs. 95–104. Genitalia and associated structures of male *Andrena* (*Calomelissa*).

Figs. 95–99: *prostomias* Pérez, 95: dorsal view of genitalia, 96: lateral view of the same, 97: ventral view of the same, 98: 8th sternum, 99: 7th sternum; figs. 100–104: *tsukubana* Hirashima, 100: dorsal view of genitalia, 101: lateral view of the same, 102: ventral view of the same, 103: 8th sternum, 104: 7th sternum.

Distribution: Japan (Honshu and Kyushu).

Specimens examined: from *Honshu:* 2 males, Yunomata, Oohata-machi, Aomori Pref., 13. vii. 1956 (K. Morimoto); 1 female, Shirahone, Nagano Pref., 19. vii. 1956 (S. Kimoto): from *Kyushu:* 3 females, Magome-Hetsuka, Sata, Prov. Osumi, 24. v. 1952 (Esaki and Hirashima).

Flower record: *Deutzia crenata* Sieb. et Zucc.

B. Group of *mitakensis*.

(16) *Andrena* (*Calomelissa*) *mitakensis* sp. nov.

This species is characterized by the metasoma elongate, widest at about the apex of 3rd metasomal tergum which is situated beyond the middle of metasoma, and the metasoma gently tapering basally from this point. This character makes a special appearance to this species and it enables to distinguish this from others at a glance. This species is further characterized by the propodeum and mesopleuron are hardly roughened just as they are in the species of *prostomias*-group, from which, however, it can easily be distinguishable by the vertex well developed and arched in front view, the female facial fovea much narrower and deeper, and the male clypeus as well as the lower paraocular areas ivory white.

Although our knowledge on this species is scarce, it may be summarized from the present collecting data that this species flies in autumn and the distribution of it is restricted to the mountainous regions of central Honshu.

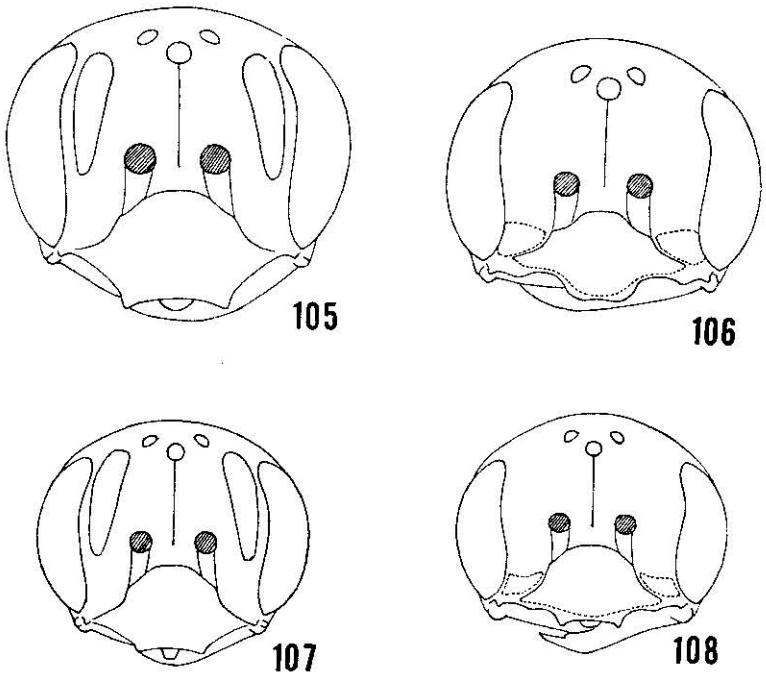
Female: Slender, length about 11 mm.

Colour: Black; mandibles reddened apically; flagellum beneath reddish brown; wings more or less distinctly brownish subhyaline, veins and stigma brown; tegula narrowly brownish subhyaline posteriorly, the rest of it blackened; legs obscure piceous, with tarsi brownish; tibial spurs yellowish brown; metasoma obscure piceous basally, with posterior margins of metasomal terga yellowish brown subhyaline.

Pubescence: Hairs on head and thorax raher short to short, not dense, those on metasoma scanty; hairs on mandibles and labrum brown; hairs on clypeus sparse, suberect, brownish, those on face slightly denser and paler; hairs on occiput and cheeks whitish; facial fovea brown above, paler below, bright in some light; hairs on mesoscutum brown medially, paler or whitish on periphery, not conspicuous; hairs on scutellum short, brown, longer and whitish posteriorly and laterally; hairs on metanotum whitish; propodeal corbicula with dorsal fringe of more or less long, somewhat dense, not well arranged, white hairs; interior of corbicula with short, sparse, fine hairs; trochanteral floccus imperfect, scanty, white; femoral floccus scanty, long, silver white; tibial scopa large, composed of long (hairs on outer face and on posterior margin longer than width of tibia), loose, dense and simple hairs; tibial scopa brown, narrowly silver white in front; disc of lst metasomal tergum bare; cilia on 2nd and following terga brownish; caudal fimbria large, brown; posterior margin of 2nd metasomal tegum with lateral, that of 3rd with narrowly interrupted or nearly complete, that of 4th with entire, rather broad bands of short, appressed, white hairs; hairs on metasomal sterna brownish to brown.

Structure: Head of moderate size, as broad as thorax seen from above; mandibles moderately long, robust; malar space very narrow anteriorly, slightly widened posteriorly, about or less than one-fifth time as broad as base of mandible at middle; process of labrum short, nearly triangular with apex more or less rounded and thickened; clypeus more or less well convex, tessellate basally, nearly smooth (therefore shining) apically, more or less densely and coarsely punctate with punctures becoming slightly stronger and coarser toward apex of clypeus; clypeus slightly exceeding line running bases of eyes, its index

about 1.9 : 1.4; facial fovea distinctly longer than broad (about 8.8 : 6.5): supraclypeal area not well convex, rugulose with an indication of weak and close punctures; facial fovea separated from eye margin by a raised space, deeply impressed and conspicuous above, with upper end occupying more than one-half of distance between orbits and post ocelli; antennae with 3rd segment longer than next two segments together; frons densely longitudinally striate with an indication of weak punctures; vertex well developed, convex, arched in front view, tessellate with more or less weak punctures; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is 1.7 : 3.8 : 2.6 : 4.5; cheeks about as broad as large eyes seen in profile, convex above, receding below, tessellate posteriorly, weakly punctate and shiny near eyes



Figs. 105–108. Front view of head of *Andrena* (*Calomelissa*).
Figs. 105–106: *mitakensis* sp. nov., 105: female, 106: male;
figs. 107–108: *kamikochiana* sp. nov., 107: female, 108: male.

Mesoscutum narrowly nearly shagreened anteriorly, weakly tessellate or nearly smooth medially, weakly shiny, somewhat sparsely punctate with punctures irregular in distribution, much weaker than those on clypeus; scutellum well convex, weakly shiny, densely punctate with punctures slightly weaker than those on mesoscutum; propodeum weakly shiny; dorsal face of propodeum densely tessellate with an indication of very weak punctures, not roughened; enclosure large, approximately triangular, nearly shagreened; mesopleuron nearly shagreened with an indication of very weak punctures anteriorly, posterior portion of mesopleuron as well as lateral face of propodeum densely and finely

tessellate. Wings with 2nd submarginal cell subparallel-sided or widened above, receiving 1st recurrent vein beyond middle or near end of cell; vein 2nd transverse cubitus ending very close to pterostigma; basal vein basad of nervulus. Legs with mid basitarsi slender, narrower than hind basitarsi; hind tibia slender, scarcely widened apically. Metasoma with 1st tergum smooth, very shiny, scattered with microscopical fine punctures; 2nd tergum smooth, shiny, scattered with microscopical punctures which are a little more distinct than those on 1st; 3rd and 4th terga nearly smooth with an indication of microscopical punctures; posterior depressions of terga broad, weakly indicated.

Male: Length about 10 mm.

Colour: Black; clypeus and lower paraocular areas ivory white; clypeus with a pair of black spots sublaterally; mandibles reddened apically; flagellum except for basal three segments reddish brown beneath; wings slightly paler in female, distal margins darkened; veins and stigma nearly brown; tegulae deep shiny brown; legs piceous with tarsi brownish; metasoma piceous with posterior margins of terga yellowish brown transparent.

Pubescence: Hairs on head and thorax rather short to more or less long, rather sparse, those on metasoma short, scanty; hairs on clypeus sparse, those on the rest of face, frons and cheeks more dense, brown; hairs on occiput and cheeks below whitish; hairs on mesoscutum rather sparse, primarily brown, whitish anteriorly; hairs on lateral and posterior parts of scutellum long, whitish; hairs on lateral portions of propodeum and on mesopleuron long, not specially dense, white; hairs on tibiae and tarsi almost brown; disc of 1st metasomal tergum nearly bare; cilia on 2nd and following terga brownish; posterior margins of 2nd and 3rd terga with lateral fringes of rather sparse, whitish hairs on 4th and following terga brown; hairs on metasomal sterna brownish to brown.

Structure: Head shiny, of moderate size, indistinctly broader than thorax seen from above; mandibles long, more or less robust, with lower teeth much exceeding inner ones and curved inward subapically; malar space very narrow anteriorly, slightly widened posteriorly; process of labrum short, much broader than long, slightly convex, shiny, with apical margin entire; clypeus well convex, nearly smooth, shiny, scattered with more or less weak punctures; clypeus short and hardly exceeding line running bases of eyes, its index about 2.1 : 0.5; lower paraocular areas smooth, shiny, more or less densely punctate; upper paraocular areas with an indication of densely punctate facial fovea; frons longitudinally weakly striate-punctate; vertex as well as upper cheeks shiny, well developed, distinctly punctate; the former sometimes tessellate; antennae with 3rd segment elongate, a little less than thrice as long as broad, about equal to 4th plus 5th which are a little longer than broad respectively; vertex arched in front view; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance to ocellocular distance is 1.7 : 3.8 : 2.7 : 4.7; cheeks well developed, about as broad as large eyes seen in profile, shiny, with rather weak punctures. Mesoscutum tessellate anteriorly, broadly nearly smooth medially, with sparse, rather weak punctures which are about as strong as those an clypeus; scutellum strongly convex, shiny, sparsely and more weakly punctate than in mesoscutum; propodeum with dorsal face tessellate or narrowly nearly shagreened basally, with an indication of weak punctures; enclosure well indicated, nearly triangular, a little more coarsely sculptured

than the rest of propodeum; mesopleuron densely tessellate with an indication of weak punctures. Wings nearly as in female. Legs with femora somewhat swollen; tibiae and tarsi, especially hind ones, slender. Metasoma elongate, smooth and strongly shiny; 1st tergum with very sparse, 2nd and following terga with sparse, microscopical fine punctures; posterior depressions of terga more or less broad, not sharply indicated; 6th metasomal sternum reflected apically with apical margin broadly and deeply triangularly emarginate medially. Genitalia and subgenital sterna as illustrated.

Distribution: Japan (central Honshu).

Type material: Holotype male, allotype female, Mt. Mitake, Okutama, Tokyo, 16. ix. 1951 (T. Shida and R. Ishikawa); paratopotype male and female, same data as holotype; paratopotype female, 3. x. 1953 (H. Nagase); 1 female, Karuizawa, Nagano Pref., 10. ix. 1955 (R. Ishikawa).

Type depositories: Holo-, allo- and 2 paratypes to the collection of the Entomological Laboratory, Kyushu University; 2 paratypes to the collection of R. Ishikawa.

Specimens examined other than type material: 1 male, Usuitoge, Honshu, 15. ix. 1949 (R. Ishikawa); 1 male, Kamikochi, Honshu, 7. ix. 1951 (R. Matsuda).

Flower record: Not available.

(17) *Andrena (Calomelissa) kamikochiana* sp. nov.

This species is a very close relative of *Andrena mitakensis* Hirashima but is much smaller, and the female can only be separable from that of the latter with some difficulty. The male is more easily distinguishable from that of *mitakensis* than the female; the mandibles shorter, the clypeus less convex, the 3rd and 4th antennal segments shorter, the propodeal enclosure slightly more elongate (very slightly produced in *mitakensis*), the apex of paramere shorter (elongate in *mitakensis*) and the apex of aedeagus rounded (pointed in *mitakensis*).

According to the collecting data, this species flies in August and the distribution of it is restricted to central Honshu and Hokkaido.

Female: Length about or less than 8.5 mm.

Colour: Black; mandibles reddened apically; flagellum brownish or reddish brown beneath; wings slightly brownish subhyaline with distal margins more darkend; veins and stigma yellowish brown; tegulae shiny brown posteriorly, blackened anteriorly; legs piceous, tarsi brownish; tibial spurs yellowish brown; metasoma piceous basally with posterior margins of terga slightly brownish transparent.

Pubescence: Hairs on head and thorax short to more or less long, sparse, those on metasoma short, scanty; hairs on head, including those on scapes, brownish to brown except for whitish hairs on occiput and cheeks below: facial fovea entirely blackish, bright and blackish brown in some light; hairs on mesoscutum brown; hairs on scutellum brown anteriorly, long and paler laterally; hairs on propodeum whitish, sparse; dorsal fringe of propodeal corbicula scanty, not well arranged; interior of corbicula with short, fine hairs; hairs on mesopleuron more or less long, not dense, whitish to white; trochanteral floccus nearly perfect, not dense, white; femoral floccus silver white; tibial scopa large, composed of long (hairs on outer face and posterior margin of hind tibia longer

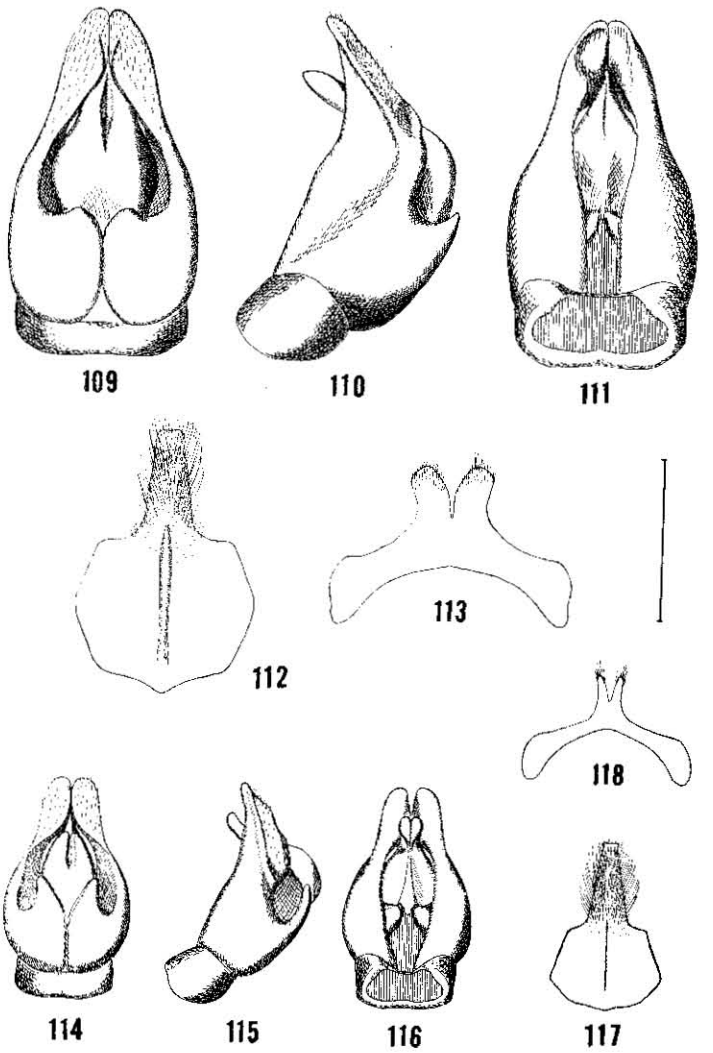
than width of tibia), dense, simple hairs; tibial scopa brown, narrowly silver white in front, disc of 1st tergum bare; cilia on 2nd and following terga brownish; caudal fimbria blackish brown; posterior margin of 2nd tergum with lateral, that of 3rd with more broad, that of 4th with more broad or nearly contiguous fringes of short, appressed, white hairs; hairs on metasomal sterna brownish.

Structure: Head of moderate size, about as broad as thorax seen from above, more or less rounded in front view; mandibles moderately long, robust; malar space very narrow anteriorly, widened posteriorly, about one-fouth time as broad as base of mandible at middle; process of labrum small, nearly triangular with apex roundly convex; clypeus well convex, shagreened with an indication of coarse punctures, nearly dull; clypeus slightly exceeding line running bases of eyes, its index about 1.6 : 1.0; facial quadrangle longer than broad (about 6.7 : 5.2); lower paraocular areas densely tessellate with an indication of weak punctures (shiny and more or less strongly punctate in *mitakensis*); facial fovea deep, separated from eye by a narrow raised space, with upper end occupying more than one-half of distance between orbit and post ocellus; antennae with 3rd segment approximately as long as 4th plus 5th which are broader than long respectively; frons coarsely sculptured; vertex well developed, arched in front view, densely tessellate or nearly weakly shagreened, impunctate, dull; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance about 1.3 : 2.3 : 2.0 : 4.0; cheeks about as broad as eyes seen in profile, rather convex, broadly tessellate posteriorly, narrowly smooth and weakly punctate near eyes. Mesoscutum tessellate, more densely so anteriorly, very weakly and more or less densely punctate, feebly shiny; mesoscutellum well convex, densely tessellate-punctate with punctures very small, weaker than those on mesoscutum; dorsal face of propodeum densely tessellate, impunctate, dull; enclosure large, nearly triangular, ill defined, densely and weakly wrinkled basally, nearly shagreened apically; mesopleuron densely tessellate or nearly weakly shagreened anteriorly, nearly impunctate, dull above, weakly shiny below. Wings with 2nd submarginal cell parallel-sided or a little widened above, receiving 1st recurrent vein beyond middle or near end of cell; basal vein interstitial with or distad of nervulus. Legs with mid basitarsi scarcely expanded medially, narrower than hind basitarsi; hind tibiae slender. Metasoma shiny; 1st to 4th metasomal terga microscopically tessellate, scattered with microscopical fine punctures; posterior depressions of metasomal terga hardly indicated medially.

Male: Length about 7.5 mm. or occasionally smaller.

Colour: Black; clypeus entirely and lower paraocular areas narrowly to more or less broadly ivory white; clypeus without or occasionally with a pair of black spots sublaterally; mandibles reddened apically; flagellum reddish brown beneath; wings slightly brownish, distal margins a little more darkened; veins and stigma brown or slightly paler; tegulae shiny brown; legs piceous with tarsi brown; metasoma nearly piceous, with posterior margins of terga pale brownish subhyaline.

Pubescence: Hairs on head and thorax rather short to more or less long, not dense, those on metasoma short, scanty; hairs on clypeus sparse, suberect, white; hairs on the rest of head slightly more dense, white or whitish on lower paraocular areas and cheeks below, brownish to brown on face, frons, vertex and cheeks above; hairs on mesoscutum and scutellum rather long, nearly



Figs. 109–118. Genitalia and associated structures of male *Andrena* (*Calomelissa*).

Figs. 109-113: *mitakensis* sp. nov., 109: dorsal view of genitalia, 110: lateral view of the same, 111: ventral view of the same; 112: 8th sternum, 113: 7th sternum; figs. 114–118: *kamikochiana* sp. nov., 114: dorsal view of genitalia, 115: lateral wiew of the same, 116: ventral view of the same, 117: 8th sternum, 118: 7th sternum.

uniformly brownish, or whitish on mesoscutum anteriorly and on scutellum posteriorly; hairs on propodeum and mesopleuron white; 1st tegrum hairy only laterally; cilia on 2nd and following terga brownish; hairs on 5th and 6th terga brownish; 2nd and 3rd terga with lateral fringes of somewhat sparse, suberect, white hairs posteriorly; similar and less evident hairs present on posterior margin of 4th tergum laterally; metasomal sterna with nearly white hairs.

Structure: Head more or less large, slightly broader than thorax seen from above; mandibles moderately long, rather robust, with lower teeth not much exceeding inner ones, not specially curved, as in *mitakensis*; malar space very narrow anteriorly, widened posteriorly; process of labrum almost protuberant; clypeus slightly convex, nearly smooth, shiny, sparsely and weakly punctate; clypeus hardly exceeding line running bases of eyes, its index about 1.9 : 0.4; facial quadrangle longer than broad (about 6.1 : 4.8); lower paraocular areas weakly tessellate, rather densely punctate with punctures about as strong as or slightly stronger than those on clypeus; frons coarsely sculptured; upper paraocular areas with an indication of densely punctate facial fovea; antennae with 3rd segment about twice as long as broad, about as long as 4th plus 5th; 4th segment slightly broader than long, 5th approximately as long as broad, 6th and following segments longer than broad; vertex well developed, arched in front view, densely tessellate or nearly shagreened; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance about 1.3 : 2.6 : 2.1 : 4.3; cheeks broader than eyes seen in profile, well convex above, very slightly receding below, tessellate posteriorly, smooth and weakly punctate near eyes. Mesoscutum tessellate, densely so anteriorly and weakly so or narrowly nearly smooth medially, sparsely and weakly punctate with punctures hardly stronger than those on clypeus; scutellum strongly convex, tessellate with very weak punctures, weakly shiny; propodeum very densely tessellate or nearly shagreened, dull; enclosure large, nearly triangular, poorly defined, weakly wrinkled basally, shagreened elsewhere; lateral face of propodeum slightly less tessellate and a little more shiny than dorsal face of propodeum; mesopleuron densely tessellate or nearly shagreened anteriorly, with an indication of weak punctures. Wings nearly as in female. Legs slender, as usual. Metasoma shiny; 1st tergum smooth, scattered with microscopical fine punctures; 2nd tergum tessellate basally, smooth apically, with punctures about as strong as or a little more larger than those on 1st; 3rd tergum a little more tessellate basally than in 2nd; 4tn and 5th terga with punctures obsolescent; posterior depressions of terga very weak, hardly indicated medially. Genitalia and subgenital sterna as illustrated.

Distribution: Japan (Honshu and Hokkaido).

Type material: Holotype male, Kamikochi, Nagano Pref., 9. viii. 1957 (R. Ishikawa); allotopotype female, same data as allotype; paratype male and female, Sarukura, 1,240 m., Shiroumadake, Nagano Pref., 19-21. viii. 1957 (R. Ishikawa); paratype female, Nikko-Yumoto, Prov. Shimotsuke, 15. viii. 1937 (T. Esaki and K. Yasumatsu); 2 paratype males, Nishiashoro, Prov. Tokachi, 6. viii. 1953 (Y. Hirashima); paratype male, Ikomanbetsu, Mt. Daisetsu, Hokkaido, 23-25. vii. 1955 (Y. Hirashima).

Type depositories: Holo-, allo- and 5 paratypes are preserved in the collection of the Entomological Laboratory, Kyushu University; 4 paratypes to the collection of R. Ishikawa.

Flower record: Not available.

3. Subgenus *Chlorandrena* Pérez

Chlorandrena Pérez, 1890, Act. Soc. Linn. Bordeaux, 44: 172; Hedicke, 1933, Mitt. Zool. Mus. Berlin, 19: 211; Hirashima, 1952, Mushi, 24: 62.

Type-species: Andrena humilis Imhof, 1832. (By designation of Hedicke, 1933.)

Diagnosis: This subgenus is characterized by the flat and entire or slightly emarginate process of labrum, the rather abundant and concolorous pubescence of the body, the poorly developed propodeal corbicula, the perfect trochanteral floccus, the presence of the branched hairs on the femoral floccus and the considerably well developed tibial scopa which is composed of the long dense branched hairs. *Chlorandrena* is closely related to *Chrysandrena*, but is distinguished by the roughened integument with the "Körnchenpunkten".

The subgenus is represented by only a single species in Japan.

Description: Medium-sized species, integument black with "Körnchenpunkten". Head round or more or less transverse in front view; process of labrum flat, entire or slightly emarginate; malar space almost obsolescent; inner eye margins subparallel, or slightly convergent below in male; thorax with none of pubescence black; enclosure of propodeum not sharply indicated, rugulose to granulate, not specially roughened; dorsal face of propodeum as well as mesopleuron shagreened, not especially coarsely sculptured; fore wings with three submarginal cells; metasomal terga tessellate with "Körnchenpunkten"; posterior depressions of terga broad, well indicated.

Female: Facial fovea wide and sharply indicated (rounded and deeply impressed) above, narrowed and obscured downwards, separated from eye margin by a punctate space; 3rd antennal segment slightly longer than 4th plus 5th; propodeal corbicula poorly developed with hairs on dorsal margin rather long and scanty, not arranged in a fringe; interior of corbicula with sparse, fine, branched hairs; trochanteral floccus nearly perfect to perfect, long, dense; femoral floccus long, dense, composed of branched hairs; tibial scopa considerably well developed with long, dense, branched hairs; posterior spur of hind tibia slightly widened and curved near base; mid basitarsi scarcely expanded medially, subequal to or narrower than hind basitarsi; metasoma hairy, posterior margins of metasomal terga without hair fringes but hairs slightly denser than elsewhere.

Male: Clypeus black or pale yellow; 3rd antennal segment elongate, as long as or longer than 4th plus 5th; cheeks not specially developed; posterior margins of intermediate metasomal sterna densely fringed with curled bright hairs; genitalia large with parapenial lobe strongly produced, apex rounded or acute; paramere usually more or less modified apically; aedeagus slender or slightly widened basally, with sides not excavated.

(18) *Andrena (Chlorandrena) taraxaci chikuzenensis* Hirashima

Andrena (Chlorandrena) taraxaci chikuzenensis Hirashima, 1957, Mushi, 30: 52, female and male.

This subspecies can primarily be separable from the nominate form which occurs in Europe by the pubescence of the head much paler and the integuments of the mesoscutum, scutellum and metasomal terga less coarsely sculptured. The male genitalia has the parapenial lobes less produced.

Although this subspecies is found only in nothern Kyushu at the present time, it may occur throughout Japan. The subspecies flies early in spring and has one generation in a year. It primarily associates with the flower of *Sonchus oleraceus* L.

The following descriptions are based upon the holo- and allotype respectively.

Female: Length about 10 mm.

Colour: Black; mandibles reddened apically; basal tubercles of mandibles reddish; flagellum beneath reddish brown; wings transparent, distal margins hardly darkened; veins and stigma pale yellowish brown; tegulae paler than in nominate form, brownish subhyaline posteriorly, deeper brown anteriorly; legs nearly piceous; hind tibiae brownish; hind tarsi more brownish, a little paler than in nominate form; tibial spurs pale yellowish brown; posterior margins of metasomal terga yellowish brown.

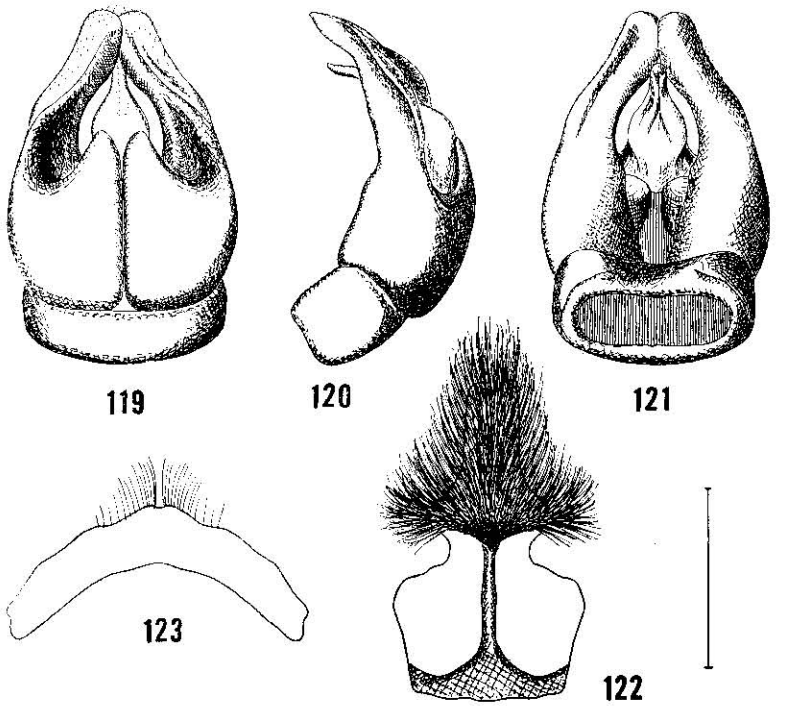
Pubescence: Hairs on full body rather abundant and nearly uniform in colour, dusky yellowish brown, except for tibial scopa and caudal fimbria which are rather bright and for some nearly fuscous hairs on sides of face, frons and cheeks above; in nominate form, hairs on head primarily nearly fuscous; facial fovea blackish; hairs on thorax above not obscure integument; propodeal corbicula with dorsal fringe of long, not arranged hairs; trochanteral floccus perfect, compact; femoral floccus composed of dense, long, branched hairs; tibial scopa very large, compact, composed of similar hairs on hind femora; hairs on posterior margins of 2nd to 4th metasomal terga downy, slightly more dense than those on elsewhere; caudal fimbria long, compact.

Structure: Head about as broad as thorax seen from above; mandibles moderately long, robust; malar space very narrow but not linear, slightly widened posteriorly; process of labrum much broader than long, with apical margin entire; clypeus well convex, dull, closely punctate with punctures small and rather roughened; clypeus slightly exceeding line running bases of eyes, its index 2 : 1.4; facial quadrangle longer than broad (9 : 7.7); facial fovea separated from eye margin by a narrow space, well indicated and wide above, gradually narrowed downwards; antennae rather short with 3rd segment longer than next two segments together which are broader than long respectively; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocelloculor distance is 1.5 : 2 : 4.7 : 5.3; cheeks broader than eyes seen in profile, rather convex above, slightly receding below, striate-punctate or nearly weakly roughened. Mesoscutum less coarsely sculptured than in nominate form, weakly tessellate and slightly shiny posteriorly; otherwise densely tessellate, duller, with punctures weak, roughened anteriorly; scutellum nearly flat, a little more smooth and more shiny than mesoscutum, weakly punctate with punctures slightly weaker than in nominate form; propodeum roughened, dull; enclosure ill defined, nearly shagreened, rugulose basally; mesopleuron roughened. Wings with 2nd submarginal cell receiving 1st recurrent vein a little before middle of cell; basal vein basad of nervulus. Legs with mid basitarsi scarcely expanded medially, subequal to hind basitarsi in width. Metasomal terga tessellate with weak, roughened punctures, less coarsely sculptured than in nominate form;

posterior depressions of intermediate terga broad, rather well indicated.

Male: Length about 8 mm.

Colour: Black; mandibles reddened apically; basal tubercles of mandibles reddish; flagellum brownish beneath; wings, including veins and stigma, more paler than in female and more paler than in nominate form; tegulae paler than in nominate form, brownish subhyaline posteriorly, deeper brown anteriorly; legs nearly piceous, tarsi and apices of hind tibiae brownish, paler than in nominate form, posterior margins of metasomal terga reddish brown.



Figs. 119–123. Genitalia and associated structures of male *Andrena (Chlorandrena) taraxaci chikuzenensis* Hirashima.

Fig. 119: dorsal view of genitalia, 120: lateral view of the same, 121: ventral view of the same, 122: 8th sternum, 123: 7th sternum.

Pubescence: Hairs on full body long and abundant but not distinctly obscure integument; hairs on face, including clypeus, and cheeks whitish, those on frons, vertex and cheeks above slightly yellowish; head without brownish or brown hairs; hairs on apical margin of clypeus downy; hairs on thorax yellowish above, whitish below; hairs on metasomal terga more yellowish apically than basally; posterior margins of 2nd to 5th metasomal sterna each with a complete fringe of dense, suberect, bright, nearly fulvous hairs.

Structure: Head of moderate size; mandibles rather short, robust; malar space very short but not linear, slightly widened posteriorly; process of labrum

distinctly transverse, slightly convex, very slightly emarginate apically; clypeus strongly convex, especially so anteriorly, densely rugoso-punctate with punctures small, more evident than in nominate form; clypeus slightly exceeding line running bases of eyes, its index 2 : 1; facial quadrangle longer than broad (8 : 6.5); antennae rather short, with 3rd segment about twice as long as broad, slightly longer than next two segments together which are distinctly broader than long respectively; 5th segment of antenna shorter than that of nominate form in which it is indistinctly broader than long; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is 1.5 : 2 : 4.3 : 5; cheeks broader than eyes, slightly receding, striate-punctate or nearly weakly roughened. Mesoscutum much less coarsely sculptured than in nominate form, narrowly nearly smooth medially, otherwise densely tessellate, with more or less roughened punctures; scutellum more densely punctate than in mesoscutum; propodeum roughened, dull; enclosure poorly defined, nearly shagreened, rugulose basally; mesopleuron dull, more roughened than in nominate form. Wings with 2nd submarginal cell receiving 1st recurrent vein before middle of cell; basal vein slightly basad of nervulus. Legs without special modification. Metasomal terga weakly shiny, with roughened puncutres; posterior margins of apical terga broad and well indicated, that of 6th tergum somewhat thick, gently emarginate. Genitalia and subgenital sterna as illustrated.

Distribution: Japan (Kyushu).

Flower records: This subspecies has been collected on the flowers of *Taraxacum platycarpum* Dahlst. and *Sonchus oleraceus* L. It is known that the nominate form primarily associates with the flowers of *Taraxacum*.

4. Subgenus *Chrysandrena* Hedicke

Chrysandrena Hedicke, 1933, Mitt. Zool. Mus. Berlin, 19: 211; Hirashima, 1952, Mushi, 24: 62.

Type-species: *Apis fulvago* Christ, 1791. (Original designation.)

Diagnosis: The subgenus is very close to *Chlorandrena* but can primarily be separated from it by the integument more smooth, without such "Körnchenpunkten". The metasoma is much scanty of hairs, with the posterior margins of the metasomal terga are fringed with more dense hairs. So far as the type species is concerned, the facial fovea short, not exceeding below the line running the lower margins of the antennal sockets, separated from the eye margin by a narrow punctate space, with the upper end more or less narrow and not sharply indicated. The posterior spur of the hind tibia of the female is neither widened nor curved near the base in the type species, but it is not specially widened but distinctly curved subbasally in Japanese species.

So far as known, the subgenus is represented by only a single species in Japan.

Description: Rather small to large species, integument black with hind tibiae and tarsi sometimes ferruginous; head moderate in size; inner margins of eyes subparallel or occasionally slightly convergent below; process of labrum transverse, entire or slightly emarginate apically, occasionally slightly convex in male; malar space obsolescent; thorax without black pubescence; propodeal

enclosure not well indicated, at least rugose basally; dorsal face of propodeum as well as mesopleuron shagreened to more or less roughened; fore wings with three submarginal cells; metasoma scanty of hairs, posterior margins of metasomal terga not well indicated.

Female: Facial fovea separated from eye margin by a narrow space, less indicated than in *Chlorandrena*; 3rd antennal segment about equal to 4th plus 5th; propodeal corbicula poorly developed, with dorsal fringe of long, scanty, not well arranged hairs; interior of corbicula with sparse, simple hairs; trochanteral floccus perfect, dense; femoral floccus with long, dense, branched hairs; tibial scopa considerably well developed with long, dense, branched hairs; poterior spur of hind tibia either curved near base or normal; mid basitarsi slender, slightly narrower than hind basitarsi; posterior margins of metasomal terga with sparse fringes of decumbent hairs.

Male: Clypeus black or pale yellow; lower paraocular areas sometimes yellow; 3rd antennal segment subequal to or longer than 4th; posterior margins of intermediate metasomal sterna fringed with curled, bright hairs; genitalia rather large, with parapenial lobe strongly produced and rounded apically; paramere elongate; aedeagus slender, with sides not excavated.

(19) *Andrena (Chrysandrena) knuthi* Alfken

Andrena knuthi Alfken, 1900, Ent. Nachr., 26: 178, female; Cockerell, 1911, Proc. U. S. Nat. Mus., 40: 243, male; Cockerell, 1913, Ann. Mag. nat. Hist., (8) 11: 189, male; Alfken, 1932, Mitt. Deut. Ent. Ges., 3: 117, female and male; Yasumatsu, 1941, Peking Nat. Hist. Bull., 15: 277; Uéda, 1954, Trans. Shikoku ent. Soc., 4: 50.

Andrena (Chrysandrena) knuthi: Hirashima, 1952, Mushi, 23: 41, female and male.

This species is the only representative of the subgenus *Chrysandrena* in Japan where it is one of the commonest bees which fly in May. The recognition of this species is easy owing to the female tibial scopa which is considerably large and composed of densely branched hairs, and to the male clypeus usually tinged with yellow.

This species appears once a year. The biology of this species was observed by me in 1960. The outline of it is presented in Part 1 of this paper.

Female: Length about 9 mm.

Colour: Black; mandibles reddened apically; flagellum beneath reddish brown; wings yellowish subhyaline, veins and stigma yellowish brown; tegulae yellowish brown transparent, narrowly brown apically; legs piceous, hind tibiae and tarsi distinctly brownish; tibial spurs yellow; metasoma occasionally partly piceous; posterior margins of metasomal terga broadly yellowish transparent.

Pubescence: Hairs on full body including legs nearly concolorous in yellow, not mixed with brownish hairs; hairs on head and thorax more or less short, not specially dense, not obscure integument, those on metasoma scanty; hairs on clypeus nearly as dense as those on face; hairs on mesopleuron rather long; dorsal fringe of propodeal corbicula scanty, with hairs not arranged in a compact fringe; interior of corbicula hairy posteriorly; trochanteral floccus well developed; femoral floccus dense, composed of long branched hairs; tibial scopa considerably well developed, composed of long, dense, densely branched hairs;

1st tergum broadly bare dorsally; posterior margin of 2nd with lateral, that of 3rd with more broad, that of 4th with nearly complete, sparse fringes of subappressed soft branched hairs; cilia on terga becoming longer and slightly denser toward apical terga; caudal fimbria dense.

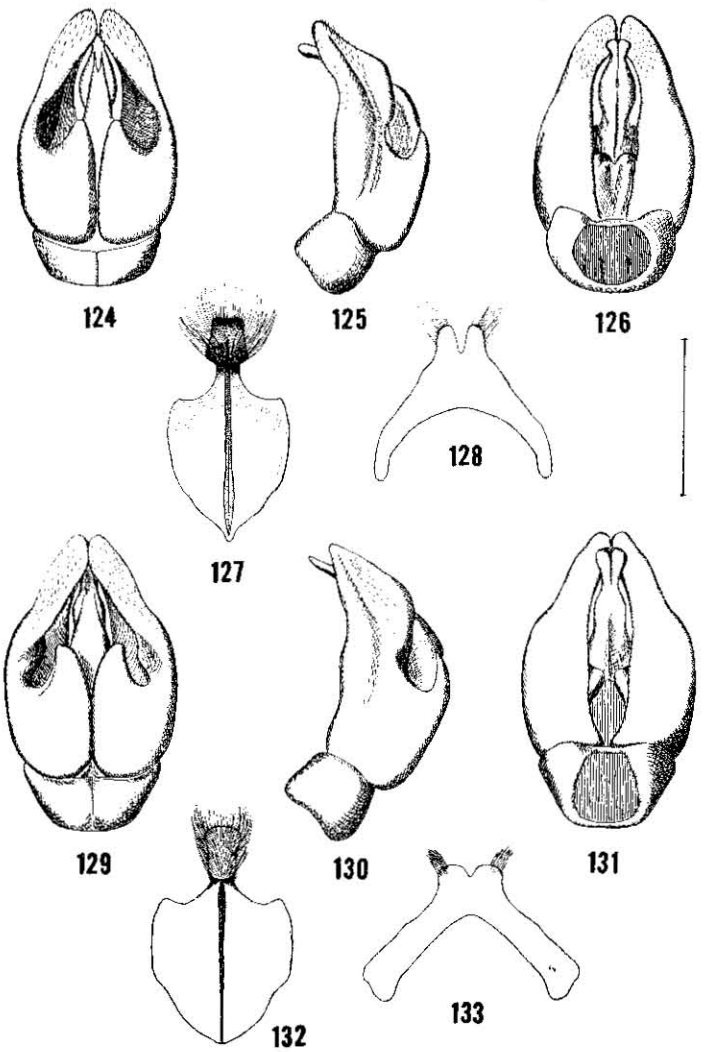
Structure: Head of moderate size, only slightly transverse in front view; mandibles rather long, robust, still broad subbasally; malar space nearly linear; process of labrum rather short, apex entire; clypeus well convex, tessellate-punctate basally, nearly smooth and more coarsely punctate apically, with punctures contiguous to two puncture widths apart; clypeus slightly exceeding line running bases of eyes, its index about 1.7 : 1.2; facial quadrangle rather distinctly longer than wide (about 7 : 6); facial fovea well indicated, separated from eye margin by a narrow space; antennae short, with 3rd segment about as long as next two segments together; each intermediate segment of flagellum broader than long; ratio of postocellar width to ocelloccipital distance to potocellar distance to ocellocular distance is 1.5 : 1.5 : 3.4 : 4.5; cheeks about as broad as eyes seen in profile, somewhat receding, weakly punctate near eyes, weakly tessellate-punctate posteriorly. Mesoscutum narrowly tessellate-punctate anteriorly, broadly nearly smooth with enamel-like lustre posteriorly, more or less coarsely punctate with punctures irregular in distribution, contiguous to several puncture widths apart; scutellum well convex, shiny, more weakly punctate than in mesoscutum; propodeum rather shiny, tessellate or rugulose, with an indication of roughened punctures; enclosure poorly defined, tessellate, narrowly wrinkled basally; mesopleuron sculptured about as in propodeum but with more coarser punctures. Wings with 2nd submarginal cell large, receiving 1st recurrent vein near middle of cell; basal vein distad of nervulus. Legs with mid basitarsi scarcely expanded medially, indistinctly narrower than hind basitarsi: posterior spur of hind tibia elongate, slightly widened and curved subbasally. Metasoma nearly smooth and shiny; 1st tergum with sparse microscopical punctures; 2nd and following terga with punctures very weak, becoming slightly more evident toward apical terga; posterior depressions of terga not well indicated.

Male: Length about 8 mm.

Colour: Black; clypeus nearly entirely or at least more than lower half of clypeus pale yellow; mandibles reddened apically; flagellum beneath reddish brown; wings subhyaline, distal margins a little darkened; veins and stigma yellowish brown; tegulae broadly brownish subhyaline, narrowly brown anteriorly; legs piceous, tibiae and tarsi brownish; posterior margins of metasomal terga broadly yellowish transparent.

Pubescence: Hairs on head and thorax rather long and more or less dense, not obscure integument, those on metasoma short and scanty; hairs on clypeus white, downy anteriorly; hairs on face, frons, vertex and cheeks above yellowish; hairs on thorax yellowish above, whitish below, not mixed with brownish hairs; cilia on metasomal terga yellowish; posterior margins of 2nd tergum with lateral, that of 3rd with more broad, that of 4th with nearly complete, indistinct fringes of downy yellowish hairs; metasomal sterna, especially 2nd, hairy throughout; posterior margins of 2nd to 5th sterna each with a sparse fringe of suberect, whitish hairs.

Structure: Head of moderate size; mandibles moderately long, rather slender; malar space nearly linear, densely pubescent posteriorly; process of labrum



Figs. 124–133. Genitalia and associated structures of male *Andrena* (*Chrysandrena*).

Figs. 124–128: *knuthi* Alfken, 124: dorsal view of genitalia, 125: lateral view of the same, 126: ventral view of the same, 127: 8th sternum, 128: 7th sternum; figs. 129–133: *knuthi okinawana* Matsumura et Uchida, 129: dorsal view of genitalia, 130: lateral view of the same, 131: ventral view of the same, 132: 8th sternum, 133: 7th sternum.

transverse, slightly emarginate at tip; clypeus well convex, shiny, more or less densely punctate; clypeus only slightly exceeding line running bases of eyes, its index about 1.9 : 1.8; facial quadrangle rather distinctly longer than broad (about 7 : 5.3); antennae moderately long, 3rd segment about one and one-half times as long as broad, much shorter than 4th plus 5th; 4th segment a little broader than long, 5th about as long as broad, 6th a little longer than broad; ratio of postocellar width to ocelloccipital distance to postocellar distance to ocellocular distance is 1.3 : 1.5 : 3 : 4.5; ocellocular space more or less deeply concaved; cheeks slightly narrower than large eyes seen in profile, much receding, rugulose, with an indication of weak, somewhat roughened punctures. Mesoscutum shiny, densely tessellate anteriorly, more or less coarsely punctate with punctures irregular in distribution, about as large and strong as those on clypeus or sometimes indistinctly weaker; scutellum rather strongly convex, shiny, weakly roughened posteriorly; propodeum shiny, rugulose with an indication of rather dense and roughened punctures; enclosure ill defined, tessellate, wrinkled basally; mesopleuron tessellate, with roughened punctures which are more coarser than those on propodeum. Wings as in female. Legs slender, without special modification. Metasomal terga nearly smooth and specially shiny; 1st tergum scattered with microscopical punctures, 2nd and following terga with weak, not dense, somewhat irregular punctures; posterior depressions of terga not well indicated. Genitalia and subgenital sterna as illustrated.

Distribution: Japan (Honshu including Sado and Oshima, Shikoku, Kyushu, and Yakushima).

Specimens examined: A long series of specimens mainly from Kyushu were examined.

Biology: The biology of this species is presented in Part 1 of this paper.

Flower records: This species primarily associates with the flowers of Compositae, Rosaceae and Ranunculaceae. Miyamoto (1960) recorded 16 species of pollen plants.

(20) *Andrena (Chrysandrena) knuthi okinawana* Matsumura et Uchida

Andrena okinawana Matsumura et Uchida, 1926, Ins. Mats., 1: 69, female; Yasumatsu, 1941, Peking Nat. Hist. Bull., 15: 279.

Andrena knuthi okinawana: Hirashima, 1958, Mushi, 32: 72, female; Hirashima, 1960, Mushi, 33: 54, male.

The present subspecies was originally described from Okinawa Islands as a distinct species. It occurs in abundance throughout Amami-Oshima and Tokuno-shima. The subspecies has the pubescence more brighter yellow than in the nominate form. The female of *knuthi okinawana* can be distinguishable from *knuthi knuthi* by the process of labrum a little shorter, the lower half of the clypeus a little more reticulate or shagreened so that the clypeus is less shiny, the 1st metasomal tergum less punctate, and the 2nd and following terga a little more punctate.

The male of the subspecies is distinguishable from that of the nominate form by the full space of clypeus as well as the lower portions of the paraocular

areas usually yellow, the propodeal enclosure more broadly wrinkled basally, the 2nd to 4th metasomal terga more punctate, etc. As a whole, the recognition of this subspecies is rather easy.

Distribution: Okinawa, Tokunoshima, Amami-Oshima.

Flower record: Not available.