

Three New and One Newly Recorded Species of *Drosophilidae* (Diptera) from Japan

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Abstract Three new species, *Drosophila (Hirtodrosophila) pirka* sp. nov., *D. (H.) ikedai* sp. nov. and *Nesiodrosophila sakagami* sp. nov., are described, and *Chymomyza aldrichii* STURTEVANT, 1916 is newly recorded from Japan.

Drosophila (Hirtodrosophila) pirka sp. nov.

(Figs. 1-6)

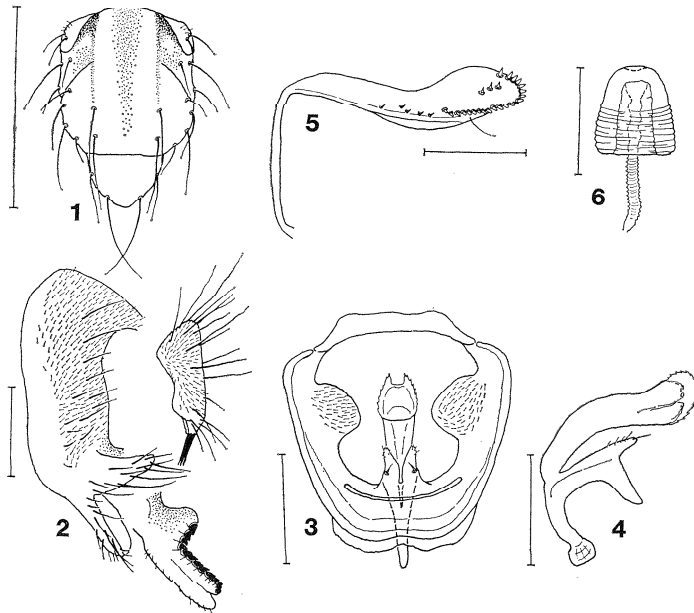
Diagnosis. Mesoscutum yellow, triangularly dark brown above humerus, sometimes with indistinct, broad, median longitudinal stripe; anterolateral triangular patch posteriorly extending, forming indistinct, narrow, longitudinal stripe along dorsocentral line (Fig. 1). Epandrium with prominent, apically somewhat round process on caudal margin just below insertion of surstylus (Fig. 2).

♂, ♀. Body length, ♂ ca. 2.1 mm (range: 1.92-2.27), ♀ ca. 2.5 mm (1.95-2.71). Thorax length (including scutellum), ♂ ca. 0.9 mm (0.78-0.95), ♀ ca. 1.0 mm (0.93-1.02).

Head:— Eye dark red, with sparse, fine pile. Antenna with 2nd joint yellow, 3rd grayish yellow. Arista with 4 or 5 (seldom 3) upper and ca. 1 (1-2) lower branches in addition to small terminal fork. Frons ca. 1/2 (mean=0.51, 0.48-0.54, measured at level of anterior ocellus) as broad as head, grayish yellow, anteriorly pale and with a few frontal hairs. Ocellar triangle black. Periorbit whitish yellow, posteriorly gray. Anterior reclinate orbital ca. 3/10 (0.30, 0.20-0.36) length of posterior reclinate; proclinate ca. 4/5 (0.80, 0.73-0.90) length of posterior reclinate. Face pale yellow; carina high, broad. Clypeus yellow. Cheek pale yellow, ca. 1/4 (0.24, 0.20-0.28) as broad as maximum diameter of eye. Vibrissa prominent; 2nd oral minute. Palpus pale yellow, flattened, apically with 1 prominent seta.

Thorax (Fig. 1):— Scutellum yellow. Thoracic pleura yellow, sometimes brownish yellow. Humerus pale yellow; humerals 2, lower one slightly longer. Acrostichal hairs in 6 rows. Anterior dorsocentral ca. 5/8 (0.64, 0.56-0.70) length of posterior; length distance of dorsocentrals ca. 1/2 (0.47, 0.39-0.53) cross distance. Prescutellars absent. Anterior scutellar ca. 3/5 (0.61, 0.56-0.67) length of posterior. Sterno-index ca. 0.75 (0.59-0.87).

Legs pale yellow; ultimate tarsal joints slightly darker. Preapicals on hind tibia; apicals on mid tibia. Fore metatarsus as long as 2 succeeding tarsal joints



Figs. 1-6. *Drosophila (Hirtodrosophila) pirka* sp. nov. — 1, Thorax; 2, periphallallic organs; 3, phallic organs (ventral view); 4, aedeagus and anterior paramere (lateral view); 5, ovipositor; 6, spermatheca. (Scale-line=1 mm in 1, 0.1 mm in the others.)

together; mid and hind metatarsi as long as 3 succeeding together.

Wing hyaline. Veins yellow; crossveins clear. R_{2+3} slightly curved to costa at tip; R_{4+5} and M nearly parallel. C1-bristles 2, ventral one thin. Wing indices: C ca. 2.6 (2.11-2.90), 4V ca. 1.9 (1.71-2.14), 4C ca. 1.0 (0.90-1.22), 5x ca. 1.8 (1.42-2.50), Ac ca. 2.6 (2.26-2.87), C3-fringe ca. 0.4 (0.34-0.49). Haltere yellowish white.

Abdomen:— Tergites pale yellow, sometimes with brown patches; 1st sublaterally with 1 pair of small spots; 2nd to 5th with medially widely interrupted and laterally tapering caudal black band and 1 pair of patches on lateral margins. Sternites pale yellow.

Periphallallic organs (Fig. 2):— Epandrium pubescent mediocaudally to dorsally, elongate below, with ca. 12 (10-14) bristles in middle to upper part, ca. 13 (12-14) on caudal process and ca. 11 (9-13) in lower part; toe somewhat round; heel indistinct. Surstylus apically bilobed, with ca. 20 (19-22) low, triangular primary teeth in concave row on inner margin and several small setae on ventral margin; primary teeth distally decreasing in size. Cercus separate from epandrium, elongate, slightly broader above, pubescent except for lower part, with 3 long, stout, black spines at caudoventral apex and ca. 20 (19-22) bristles.

Phallic organs (Figs. 3-4):— Aedeagus apically bilobed, finely serrate on margin, round in lateral view. Anterior paramere small, narrowly triangular,

apically with a few sensilla. Posterior paramere forming transverse bar connecting caudolateral corners of novasternum. Novasternum with 1 pair of small submedian spines near bases of anterior parameres; hypandrium pubescent.

♀ Reproductive organs:— Ovipositor (Fig. 5) distally elliptical, with ca. 3 discal and ca. 27 marginal teeth; ca. 5 proximal marginal teeth small, somewhat sparse in arrangement and separate from others; subterminal hair located ca. 3/4 distad on ventral margin; basal ithmus long, narrow. Spermatheca (Fig. 6) somewhat elongate and conical, apically slightly indented; introvert deep, wrinkled; basal half of outer capsule wrinkled; duct distally expanded.

Holotype ♂, Japan: Sapporo, 3. VIII. 1986, ex *Pleurotus cornucopiae* (M. J. TODA); deposited in the Entomological Institute, Hokkaido University, Sapporo, Japan (EHU).

Paratypes, Japan: 23 ♂, 40 ♀, same data as holotype; 10 ♂, 10 ♀, same data as holotype except 14. VIII. 1987; 5 ♂, 3 ♀, Nakajima, Tōya Lake, 7. VIII. 1984, ex *Pleurotus cornucopiae* (M. J. TODA); in EHU and author's collection.

Distribution. Japan: Hokkaido.

Relationship. This species belongs to the *trivittata* species-subgroup of the *quadrivittata* species group (OKADA, 1967), but can be clearly distinguished from other members by the diagnostic characters.

Remarks. The species name means 'beautiful' in the language of Ainu, a native people of Hokkaido.

Drosophila (Hirtodrosophila) ikedai sp. nov.

(Figs. 7–11)

Diagnosis. Abdominal tergites yellow; 2nd with medially interrupted caudal brown band and 1 pair of brown patches at anterosublateral corners; 3rd to 5th mostly black, in ♀ laterally yellow; 6th mostly black in ♂, with median large black patch in ♀. Surstylus with ca. 4 primary teeth (Fig. 7). Anterior paramere with large serrations on inner margin (Fig. 8). Ovipositor apically tapering, without elongate process (Fig. 10).

♂, ♀. Body length, ♀ ca. 3.0 mm (2.71–3.21). Thorax length, ♂ ca. 1.3 mm, ♀ ca. 1.5 mm (1.37–1.54).

Head:— Eye brownish red, with sparse, fine pile. Antenna grayish yellow; 3rd joint without long hairs on anterior margin. Arista with ca. 3 (3–4) upper and 1 lower branches in addition to large terminal fork. Frons ca. 1/2 (0.50, 0.49–0.51) as broad as head, brownish yellow, anteriorly with frontal hairs. Ocellar triangle black. Periorbit yellow, anteriorly curved inward. Anterior reclinate orbital ca. 3/8 (0.38, 0.30–0.50) length of posterior reclinate; proclinate ca. 9/10 (0.92, 0.86–0.95) length of posterior reclinate. Face grayish yellow; carina low, short. Clypeus dark brown. Cheek brownish yellow, ca. 2/9 (0.23, 0.21–0.27) as broad as maximum diameter of eye. Vibrissa prominent; 2nd oral minute. Palpus grayish

yellow, flattened, apically with 1 prominent seta.

Thorax:— Mesoscutum brownish yellow, with 4 diffuse, brown, longitudinal stripes; dorsocentral line pale. Scutellum brownish yellow. Thoracic pleura yellowish brown. Humerus paler; humerals 2, upper one slightly longer. Acrostichal hairs in 8 rows. Anterior dorsocentral ca. $2/3$ (0.66, 0.64–0.69) length of posterior; length distance of dorsocentrals ca. $1/2$ (0.49, 0.41–0.59) cross distance. Prescutellars absent. Anterior scutellar ca. $7/9$ (0.78, 0.73–0.83) length of posterior; posteriors nearer to each other than to anterior. Sterno-index ca. 0.5 (0.49–0.56).

Legs pale yellow. Preapicals on hind tibia; apicals on mid tibia. Mid and hind tarsi with 1 row of minute cuneiform bristles on underside. Fore, mid and hind metatarsi as long as 2, 3 and 4 succeeding tarsal joints together, respectively.

Wing hyaline. Veins brownish yellow. Crossveins clear; posterior slightly sinuate. R_{2+3} slightly curved to costa at tip; R_{4+5} and M slightly convergent distally. C1-bristles 2, ventral one weak. Wing indices: C ca. 2.2 (2.03–2.42), 4V ca. 1.8 (1.72–2.03), 4C ca. 1.0 (0.98–1.12), 5x ca. 1.9 (1.75–2.03), Ac ca. 3.2 (2.87–3.44), C3-fringe ca. 0.7 (0.66–0.72). Haltere yellowish white.

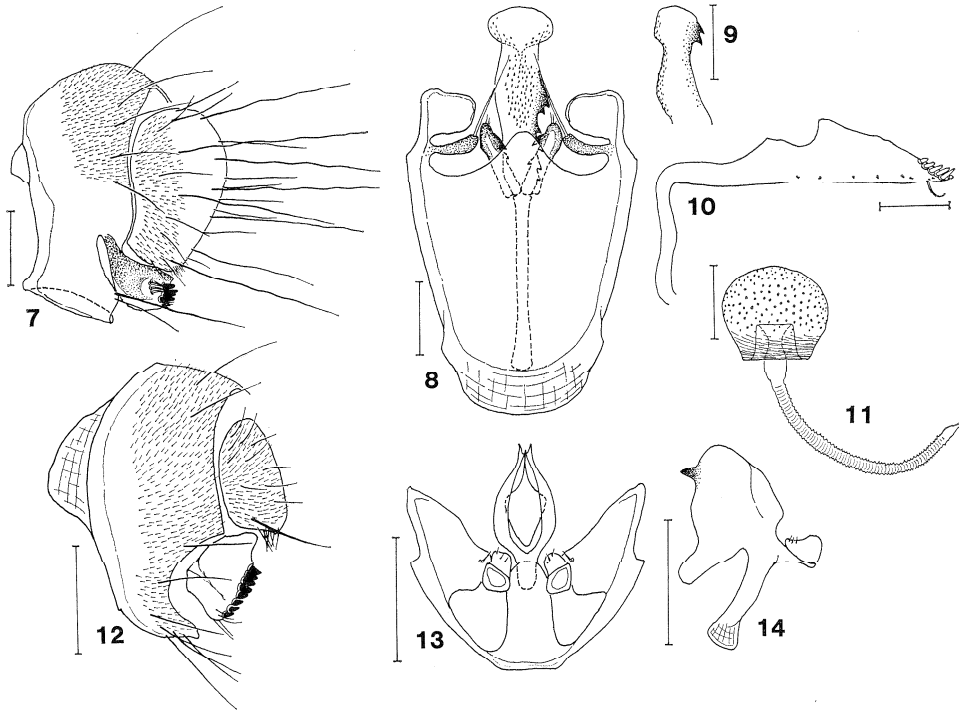
Periphallic organs (Fig. 7):— Epandrium broad, pubescent mediocaudally to dorsally, with ca. 5 or 6 bristles in middle to upper part and 2 (upper one stout, longer) at caudosubapical corner of lower part; heel somewhat pointed anteriorly; ventral margin slightly folded inward; toe somewhat pointed. Surstylus basally narrow, distally broad, slightly concave on distal margin, with bundle of ca. 3 or 4 bristles on outer surface and numerous small setae at caudoventral corner. Cercus large, somewhat quadrate, separate from epandrium, pubescent on anterior half, with ca. 23 bristles and tuft of small setae at caudoventral corner.

Phallic organs (Figs. 8–9):— Aedeagus long, apically dilated, asymmetrically serrate only on right lateral margin, with numerous minute thorn-like warts on ventral surface and large serrations dorso-apically; apodeme as long as aedeagus. Anterior paramere elongate, basally contiguous to base of aedeagus, apically not fused to novasternum and with ca. 3 sensilla. Posterior paramere absent. Novasternum longer than broad, somewhat quadrate, convex on caudomedial margin, with 1 pair of long, stout submedian spines at apices of dark colored, slender processes; hypandrium somewhat quadrate.

♀ Reproductive organs:— Ovipositor (Fig. 10) slender, dorsomedially somewhat broadened, with ca. 5 stout teeth on dorso-apical margin, 1 relatively small apical tooth, ca. 8 minute teeth on ventral margin, 1 minute terminal and 1 stout curved subterminal hairs; basal ithmus broad, ca. $2/5$ as long as ovipositor. Spermatheca (Fig. 11) somewhat spherical, basally slightly obliquely wrinkled, with numerous minute warts on middle to upper surface; introvert ca. $3/8$ as deep as height of outer capsule; duct distally and subdistally expanded.

Holotype ♂, Japan: Hirai, Kozagawa, Wakayama Pref., 18. IV. 1982, by sweeping on tree trunks (M. J. TODA); in EHU.

Paratypes, Japan: 7 ♀, same data as holotype except 10, 18. IV. 1982; in



Figs. 7-14. — 7-11, *Drosophila (Hirtodrosophila) ikedai* sp. nov.; 12-14, *Nesiodrosophila sakagamii* sp. nov. — 7, 12, Peripheral organs; 8, 13, phallic organs (ventral view); 9, apical part of aedeagus (lateral view); 10, ovipositor; 11, spermatheca; 14, aedeagus and anterior paramere (lateral view). (Scale-line=0.1 mm.)

EHU and author's collection.

Distribution. Japan: Kinki (Wakayama Pref.).

Relationship. This species belongs to the *hirticornis* species-subgroup of the *hirticornis* species-group, and somewhat resembles *D. trapezina* DUDA, 1923, in having asymmetrically serrate aedeagus (BÄCHLI, 1973) and also *D. nigripennis* KANG, LEE et BAHNG, 1965, in the morphology of novasternum, but can be distinguished from these two species by the diagnostic characters.

Remarks. This species is named in honor of the late Dr. H. IKEDA, Ehime University.

✓ *Nesiodrosophila sakagamii* sp. nov.

(Figs. 12-14)

Diagnosis. Arista with ca. 5 (5-6) upper and 1 lower branches in addition to small terminal fork. Fore metatarsus as long as 2 succeeding tarsal joints together;

mid metatarsus slightly longer than 3 succeeding together; hind metatarsus as long as rest together. Surstylus with 8 primary teeth in slightly sinuate row on distal margin; upper 4 teeth slightly larger (Fig. 12). Aedeagus smooth on apical margin in lateral view, except for 1 pair of small triangular projections on dorso-apical margin (Fig. 14).

♂. Body length ca. 2.1 mm (2.08-2.21). Thorax length ca. 0.85 mm (0.82-0.89).

Head slightly broader than thorax. Eye red, oblique to body axis, somewhat triangular in lateral view, with pile. Antenna grayish brown; 2nd joint darker; 3rd distally roundish in lateral view. Frons flat, ca. 4/9 (0.47, 0.46-0.48) as broad as head, yellowish brown, with frontal hairs on anterior margin. Ocellar triangle dark brown, especially darker on inside margins of ocelli; ocellars inserted well outside ocellar triangle. Periorbit yellow, anteriorly broadened and somewhat curved inward, ca. 4/5 as long as frons. Anterior reclinate orbital ca. 7/9 (0.79, 0.77-0.80) length of posterior reclinate, inserted outside and slightly anteriorly to proclinate; proclinate as long as posterior reclinate (1.00, 0.89-1.08). Face flat, brownish yellow, with broad white transverse band on buccal margin; upper margin of white band darker; carina indistinct. Clypeus dark brown. Cheek yellow, ca. 1/6 (0.18, 0.17-0.20) as broad as maximum diameter of eye. Second oral ca. 1/2 (0.52, 0.49-0.55) length of vibrissa. Palpus grayish yellow, distally swollen, apically with 1 short, prominent seta.

Thorax:— Mesoscutum yellowish brown, with indistinct grayish median longitudinal stripe posteriorly broadened; scutellum grayish brown. Thoracic pleura yellow, with 1 dark brown longitudinal stripe on upper half. Humerus grayish brown; humerals 3, middle one longest. Acrostichal hairs in 6 irregular rows. Anterior dorsocentral ca. 7/9 (0.79, 0.74-0.83) length of posterior; length distance of dorsocentrals ca. 3/5 (0.61, 0.58-0.64) cross distance. Prescutellars absent. Anterior scutellar as long as posterior (1.00, 0.95-1.05); posteriors nearer to each other than to anterior. Sterno-index ca. 0.45 (0.42-0.49).

Legs yellow. Preapicals on all tibiae; apicals prominent on mid tibia.

Wing slightly fuscous. Veins yellowish brown; crossveins clear. R_{2+3} slightly curved to costa at tip; R_{4+5} and M slightly divergent distally. C1-bristles 2, ventral one weak. Wing indices: C ca. 3.6 (3.25-3.89), 4V ca. 2.7 (2.49-2.89), 4C ca. 1.0 (0.88-1.04), 5x ca. 3.4 (3.03-3.85), Ac ca. 2.1 (1.95-2.17), C3-fringe ca. 0.35 (0.32-0.38). Haltere yellowish white.

Abdomen:— Tergites nearly entirely blackish brown. Sternites pale grayish yellow, longer than broad.

Periphallic organs (Fig. 12):— Epandrium pubescent except for anterior margin, with ca. 2 (1-3) bristles in upper part and ca. 7 (7-8) in lower part, broad, rectangular on caudal margin above insertion of surstylus, tapering below; toe pointed; heel indistinct. Surstylus somewhat quadrate, strongly convex on dorsal margin, caudoventrally with several setae. Cercus oval, separated from epandrium, nearly

entirely pubescent, with 1 prominent long bristle near ventral margin and ca. 11 (9–13) bristles, caudoventrally slightly pointed and with tuft of a few small bristles.

Phallic organs (Figs. 13–14):— Aedeagus robust, dorsobasally strongly protruded in lateral view; apodeme as long as aedeagus. Anterior paramere somewhat conical, with ca. 3 sensilla, contiguous to base of aedeagus. Posterior paramere absent. Novasternum with median elongate plate and 1 pair of hypandrial plates; 1 pair of small submedian spines inserted near inner margins of hypandrial plates.

Holotype ♂, Japan: Hirai, Kozagawa, Wakayama Pref., 16. IV. 1982, by sweeping on forest floor (M. J. TODA); in EHU.

Paratypes, Japan: 2 ♂, same data as holotype except 16–17. IV. 1982; Korea: 1 ♂, Mt. Booriak, Quelpart Is., 13. VIII. 1979, by sweeping at rock shelters (M. J. TODA); in EHU and author's collection.

Distribution. Japan: Kinki (Wakayama Pref.); Korea: Quelpart Is.

Relationship. This species is closely related to *N. rotundicornis* OKADA, 1966, but clearly distinguishable from the latter by the diagnostic characters.

Remarks. This species is named in honor of Prof. Sh. F. SAKAGAMI, Hokkaido University, who has been giving the author general guidance and encouragement in the studies on drosophilids for a long time.

Chymomyza aldrichii STURTEVANT

Chymomyza aldrichii STURTEVANT, 1916, *Annls. ent. Soc. Am.*, **9**: 325; TAKADA & TODA, 1981, *J. Fac. gen. Educ. Sapporo Univ.*, **18A**: 5.

Specimen examined. Japan: 1 ♂, Tomakomai, Hokkaido, 12–19. VII. 1983, ex trap (M. J. TODA).

Distribution. Widespread in the Nearctic Region; Japan (n. loc. rec.): Hokkaido (Tomakomai).

Remarks. This is the first record of this species from the Palearctic Region. However, it is likely that this species has been artificially transported along with logs imported from North America. It is known that some *Chymomyza* species breed under decayed bark of logs (WATABE, pers. comm.). And, a large lot of North American wood is landed at the port of Tomakomai every year, about 630,000 t from U.S.A. and about 300,000 t from Canada.

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