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Two Species of the Subgenus *Lordiphosa* BASDEN of the Genus *Drosophila* (Diptera, Drosophilidae) from Japan

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Synopsis A new species, *Drosophila pseudotenuicauda*, and a known species, *D. tenuicauda* OKADA, which have been regarded as two different forms of the latter species, are described and redescribed, respectively. These two species are considered to belong to the subgenus *Lordiphosa* BASDEN.

OKADA (1956) recognized two forms in *Drosophila tenuicauda* OKADA, 1956: "(1) body smaller and abdominal bands on 2–5 T widely interrupted at middle; (2) body larger and abdominal bands on 3–5 T non-interrupted." However, he found no differences between the two forms in male genitalia. Recently, I found clear interspecific differences on closer inspection of male genitalia. Dr. T. OKADA informed me that the holotype of *D. tenuicauda* OKADA belongs to the first form. In this paper the second form is described as a new species and *D. tenuicauda* OKADA is redescribed in comparison with the new species. And further, the subgeneric placement of these two species will be considered.

1. Descriptions of Species

Drosophila (*Lordiphosa*) *pseudotenuicauda* sp. nov.

(Figs. 1–8, A)

Diagnosis: This species is easily distinguishable from *D. tenuicauda* OKADA, in having complete caudal black bands on 3rd to 6th abdominal tergites uninterrupted at middle.

♂, ♀. Body length: ♂ about 2.4 mm, ♀ about 2.5 mm. Thorax length (including scutellum): ♂ about 0.9 mm, ♀ about 1.0 mm. Body generally yellowish brown.

Head: Eye brownish red, with greyish red pile. Antenna with 2nd joint yellowish brown, 3rd darker, about 1.3 to 1.4 times as long as broad. Arista with 3 or 4, seldom 5, upper and 2 lower branches besides a terminal fork. Ocellar triangle dark brown. Periorbits brownish yellow. Frons yellowish brown, paler at periphery of ocellar triangle, about half as broad as head, with a few frontal hairs. Cheek greyish yellow, about 3/10 as broad as the greatest diameter of eye. Clypeus yellowish brown. Face brownish yellow. Carina narrow and low. Anterior reclinate orbital minute, about 1/5 posterior reclinate, situated just outside proclinate,

which is about 3/5 posterior reclinate. Vibrissa very long, 2nd oral minute. Palpus greyish yellow, narrow, and with a prominent terminal and a shorter, thinner median setae.

Thorax: Mesoscutum and scutellum yellowish brown. Thoracic pleura entirely brown. Humerals 2, subequal. Acrostichal hairs in 6 rows. Anterior dorsocentrals about 3/5 to 7/10 posteriors; cross distance of dorsocentrals about 1.8 length distance. Lateral scutellars about 1.3 apicals, divergent; apicals crossed, slightly nearer to each other than to laterals. Sterno-index about 0.5 to 0.6; median sternopleural indistinguishable from neighboring small setae. Legs brownish yellow, with preapicals on all tibiae, and apicals on fore and middle; fore and middle metatarsi about as long as 3 succeeding tarsal joints together, hind metatarsus about as long as the rest; ♂ fore metatarsus without particular long hairs.

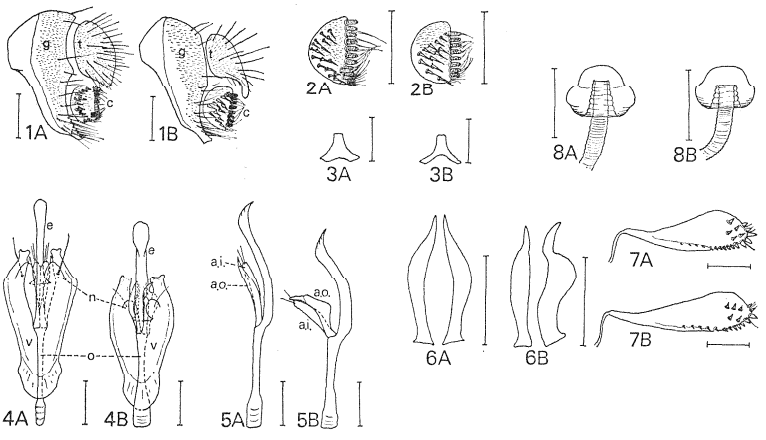
Wing: hyaline, but slightly yellowish. Veins brownish yellow. C1-bristles 2. R_{2+3} slightly curved to costa at tip; R_{4+5} and M parallel. Wing indices: C about 3.2; 4V about 2.2; 4C about 1.0; 5x about 2.3; Ac about 2.4; C3-fringe about 0.4. Halteres yellowish white.

Abdomen: Tergites yellow, each tergite with a broad brownish black caudal band, which extends forward to reach anterior margin at sides. The caudal bands on 3rd to 6th tergites uninterrupted at middle.

Periphallic organs (Figs. 1–3, A): Epandrium (g) pale yellow, piled microscopically, tapering below, and apically strongly sclerotized and truncate; upper caudal margin with about 7 or 8 hairs, and lower portion with about 16 hairs. Surstylus (c, Fig. 2A) semicircular; primary teeth apically rounded, black, about 12 in number, arranged on entire distal margin, the upper 8 or 9 teeth in a row but the lowest 3 or 4 irregularly in 2 rows; secondary teeth apically pointed, brown, about 19 in number, scattered on the outer surface of surstylus, which is piled microscopically on upper half or more; inner surface of surstylus with long curved spines. Cercus (t) oval, piled microscopically, and with about 23 long hairs and a few short ones near slightly pointed apex. Decasternum (Fig. 3A) with lateral arms nearly as broad as median process.

Phallic organs (Figs. 4–6, A): Aedeagus (e) slender and elongate, longer than aedeagal apodeme (o), nearly straight in ventral aspect (Fig. 4A) but gently curved sigmoidally in lateral aspect (Fig. 5A), without ventral process, faintly serrate on the ventral side of apical flattened area. Anterior paramere (Fig. 5A) attached to aedeagus, divided into 2 lobes; outer lobe (a.o., Fig. 6A) slightly longer than inner (a.i.), about 3/5 aedeagus, bare, and shaped like slender horn; inner lobe clavate, with about 2 sensilla at apex. Posterior paramere absent. Hypandrium (v) narrow anteriorly, about twice as long as broad. Novasternum (n) with a submedian spine.

Ovipositor (Fig. 7A) rather acutely pointed, with about 14 marginal and about 5 discal teeth; discal and several marginal teeth at distal part rather stout, the apical marginal tooth the largest; one subterminal hair at ventral margin and 3 short ter-



Figs. 1–8. Male and female genitalia of *D. pseudotenuicauda* (A) and *D. tenuicauda* (B). —— 1, Periphallic organs; 2, surstylus; 3, decasternum; 4, phallic organs (left half: dorsal aspect, right half: ventral aspect); 5, aedeagus and anterior paramere (lateral aspect); 6, outer lobes of anterior parameres (ventral aspect); 7, ovipositor; 8, spermatheca. Abbreviations: g, Epandrium; c, surstylus; t, cercus; e, aedeagus; o, aedeagal apodeme; a.o., outer lobe of anterior paramere; a.i., inner lobe of anterior paramere; v, hypandrium; n, novasternum. Scales 0.1 mm.

minal hairs on dorsal margin near the apex. Spermatheca (Fig. 8A) hemispherical, but submedially constricted strongly.

Holotype: ♂, Koryu-kozan (KK), Hokkaido, 16. IX. 1982.

Paratypes: 1 ♂, KK, 25. VII. 1977; 5 ♂, KK, 26. VIII. 1982; 8 ♂, KK, 4. IX. 1982; 6 ♂, 3 ♀, KK, 16. IX. 1982; 8 ♂, 1 ♀, KK, 24. IX. 1982; 1 ♀, Misumai (MM), Hokkaido, 22. VI. 1977; 2 ♂, 3 ♀, Morioka (MO), X. 1980; 3 ♂, 3 ♀, Hirai (HI), Kozagawa, Wakayama Pref., IV. 1982.

Type depository: Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapporo.

Other specimens examined: 4 ♀, KK, 25. VII. 1977; 3 ♀, KK, 15. VIII. 1977; 1 ♂, KK, 26. VIII. 1982; 2 ♂, 7 ♀, MO, X. 1980; 3 ♂, 6 ♀, HI, IV. 1982.

Drosophila (*Lordiphosa*) *tenuicauda* OKADA

(Figs. 1–8, B)

Drosophila (*Drosophila*) *tenuicauda* OKADA, 1956, Syst. Study: 141.

The following redescription is made referring only to the differences from the foregoing species.

♂, ♀. Body length: ♂ about 2.0 mm, ♀ about 2.3 mm. Thorax length: ♂ about 0.8 mm, ♀ about 0.9 mm. Body generally greyish yellow.

Head: Eye dark red. Antenna with 2nd joint dull yellow, 3rd darker, about

1.5 times as long as broad. Arista with 3 to 5 upper and usually 2 lower branches besides a terminal fork. Ocellar triangle black. Periorbits yellowish grey. Frons dark yellowish grey, paler anteriorly and at periphery of ocellar triangle. Cheek yellowish grey, about 1/3 as broad as the greatest diameter of eye. Clypeus dark yellowish grey. Face yellowish grey. Carina narrow and moderately high. Palpus dark greyish yellow.

Thorax: Mesoscutum and scutellum dark greyish yellow. Thoracic pleura dark yellowish grey, with obscure paler stripes or patches (paler especially at lower part of episternum). Anterior dorsocentrals about 7/10 posteriors; cross distance of dorsocentrals about 1.6 length distance. Lateral scutellars about 1.4 apicals. Sterno-index about 0.5. Legs greyish yellow.

Wing: Veins yellow. Wing indices: C about 2.6; 4V about 2.4; 4C about 1.2; 5x about 2.7; Ac about 2.5; C3-fringe about 0.4.

Abdomen: Caudal black band on each tergite widely interrupted at middle.

Periphallic organs (Figs. 1–3, B): Epandrium (g) with about 7 or 8 and 14 hairs at upper caudal and at lower portions, respectively. Surstylus (c, Fig. 2B) with about 8 or 9 primary teeth arranged in a row along median part of distal margin, and with about 18 secondary teeth. Cercus (t) produced into an elongated caudo-ventral process, and with about 15 long hairs. Decasternum (Fig. 3B) with lateral arms thinner than median process.

Phallic organs (Figs. 4–6, B): Outer lobes of anterior parameres (a.o., Fig. 6B) about half as long as aedeagus (e), and asymmetric, i.e., right one strongly broadened at submedian part and apically curved claw-like, while left one more slender and apically straight.

Ovipositor (Fig. 7B) with about 13 marginal and about 4 discal teeth. Spermatheca (Fig. 8B) submedially constricted weakly.

Specimens examined: 1 ♂, KK, 25. VII. 1977; 2 ♂, KK, 7. VI. 1982; 3 ♀, KK, 16. IX. 1982; 1 ♀, MM, 16. VI. 1977; 1 ♀, MM, 22. VI. 1977; 3 ♂, MM, 3. VII. 1982; 1 ♂, 2 ♀, Hakkenzan, Hokkaido, 7. VI. 1977; 2 ♀, Nopporo (NP), Hokkaido, 11. VI. 1977; 3 ♂, NP, 20, VI. 1977; 10 ♂, 10 ♀, MO, X. 1980; 10 ♂, 10 ♀, Kiyosumi, Chiba Pref., 17. X. 1980; 1 ♂, 1 ♀, HI, IV. 1982.

It should be remarked that the asymmetry in the outer lobes of anterior parameres is the first record in *Lordiphosa*.

2. Variation of Quantitative Characters

Intra- and inter-specific variations of 25 quantitative characters are summarized in Table 1. Of the characters compared between *D. pseudotenuicauda* and *D. tenuicauda*, seventeen (Nos. 1–3, 5, 6, 9, 10, 12–17, 21, 23) are highly significantly ($p<0.01$) different between the two species, though the ranges of all these characters overlap interspecifically.

Table 1. Intra- and inter-specific variations of quantitative characters in *D. pseudotenuicauda* and *D. tenuicauda*.

Quantitative Character		*D. pseudotenuicauda*			*D. tenuicauda*			Interspecific Difference (t-test)
		Mean±S.D.	Range	(*n*)	Mean±S.D.	Range	(*n*)	
1. Body length (mm)	♂	2.37±0.21	2.00–2.74	(14)	2.04±0.18	1.72–2.47	(25)	+($p<0.01$)
	♀	2.51±0.24	2.04–3.10	(23)	2.26±0.20	1.96–2.67	(24)	+($p<0.01$)
2. Thorax length (mm)	♂	0.94±0.07	0.81–1.06	(18)	0.80±0.04	0.71–0.88	(31)	+($p<0.01$*)
	♀	1.04±0.07	0.90–1.17	(30)	0.88±0.06	0.75–0.98	(30)	+($p<0.01$)
Arista								
3. No. of upper branches		3.5±0.5	3–5	(95)	4.0±0.6	3–6	(120)	+($p<0.01$)
4. No. of lower branches		2 ±0	2	(96)	2.0±0.2	1–3	(122)	−($0.05<p$)
5. Length/Width of 3rd antennal joint		1.35±0.06	1.21–1.45	(21)	1.48±0.12	1.14–1.81	(61)	+($p<0.01$*)
6. Cheek width/Eye diameter		0.30±0.03	0.26–0.39	(48)	0.33±0.04	0.23–0.43	(61)	+($p<0.01$)
7. Anterior reclinate/ Posterior reclinate orbital		0.22±0.04	0.16–0.32	(48)	0.21±0.03	0.16–0.29	(59)	±($0.01<p<0.05$)
8. Proclinate/ Posterior reclinate orbital		0.62±0.06	0.49–0.83	(48)	0.63±0.06	0.51–0.78	(54)	−($0.05<p$)
9. Anterior/Posterior dorsocentrals		0.65±0.05	0.55–0.78	(46)	0.69±0.05	0.58–0.85	(59)	+($p<0.01$)
10. Cross distance/ Length distance of dorsocentrals		1.84±0.16	1.32–2.23	(48)	1.58±0.13	1.34–1.97	(61)	+($p<0.01$)
11. Sterno-index		0.55±0.05	0.38–0.65	(46)	0.53±0.06	0.41–0.65	(60)	−($0.05<p$)
12. Lateral/Apical scutellars		1.28±0.09	1.12–1.50	(47)	1.39±0.08	1.22–1.66	(53)	+($p<0.01$)
Wing indices								
13. C		3.17±0.20	2.71–3.55	(48)	2.58±0.16	2.19–3.01	(61)	+($p<0.01$)
14. 4V		2.22±0.14	1.92–2.54	(48)	2.35±0.15	2.06–2.77	(61)	+($p<0.01$)
15. 4C		0.95±0.08	0.78–1.14	(48)	1.17±0.09	0.99–1.38	(61)	+($p<0.01$)
16. 5x		2.29±0.21	1.77–2.75	(48)	2.66±0.23	2.23–3.23	(61)	+($p<0.01$)
17. Ac		2.41±0.18	2.09–2.81	(48)	2.54±0.16	2.22–2.90	(61)	+($p<0.01$)
18. C3-fringe		0.40±0.04	0.31–0.49	(48)	0.38±0.05	0.29–0.51	(61)	−($0.05<p$)
Epandrium								
19. No. of upper hairs		7.5±1.5	5–10	(10)	7.5±1.5	5–10	(10)	−($0.05<p$)
20. No. of lower hairs		15.8±3.1	12–21	(10)	14.1±2.2	10–18	(10)	−($0.05<p$)
Surstylus								
21. No. of primary teeth		12.2±1.1	10–14	(10)	8.5±0.7	8–10	(10)	+($p<0.01$)
22. No. of secondary teeth		18.8±2.9	14–25	(10)	17.8±2.5	12–21	(10)	−($0.05<p$)
23. No. of long hairs on cercus		22.8±1.5	20–25	(10)	15.4±1.8	12–18	(10)	+($p<0.01$)
Ovipositor								
24. No. of marginal teeth		14.1±2.0	12–18	(10)	12.9±1.4	11–15	(10)	−($0.05<p$)
25. No. of discal teeth		4.7±0.7	3–5	(10)	4.4±1.2	2–6	(10)	−($0.05<p$)

* According to Aspin-Welch Method (cf. Ishii, 1975) in the case of unequal variance.

3. Relationships

The above two closely related species are newly included here in the subgenus *Lordiphosa* BASDEN (*D. tenuicauda* OKADA previously included in the subgenus *Drosophila* FALLÉN) in having anterior paramere with a branch from its basis, i.e, the anterior paramere is divided into two lobes. This is a particular diagnostic character of the subgenus. However, some characters of these two species are inconsistent with the subgeneric diagnosis (subsequently shown in parentheses) given by LAŠTOVKA & MÁCA (1978): median sternopleural bristle absent or minute (as long as or longer than anterior, except for *D. mommai* TAKADA et OKADA), ♂ fore metatarsus with neither particular long hairs ventrally nor sex comb, aedeagus ventrally serrated only faintly and without particular process, aedeagal apodeme shorter than aedeagus, outer lobe of anterior paramere bare (often hairy at distal part), and submedian spines present. Thus, these two species are remotely related to the other known species of the subgenus *Lordiphosa*, in which LAŠTOVKA and MÁCA (1978) recognized three species-groups, the *fenestrarum*, *nigricolor* and *miki* groups. The present two species are considered to form a new species-group, which is named the *tenuicauda* group.

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