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Three Species of the Genus *Dicrotendipes* (Diptera, Chironomidae) from Japan

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Abstract The male of *Dicrotendipes tamavidis* SASA is redescribed, while the female, pupa and larva are described for the first time. Two new species, *nigrocephalicus* and *nipporivus*, found in Japan, are added to the genus *Dicrotendipes* on the basis of both adults, male and female, and immature forms, pupa and larva.

Key words: Chironomidae; *Dicrotendipes*; new species; taxonomy; Japan.

Introduction

Recently I collected two interesting species of the genus *Dicrotendipes* in Shizuoka and Fukushima Prefectures, Japan. One species occurs in standing water and another in running water. They greatly resemble one another, and are related to *D. nervosus* and *D. flexus* in the morphology of their adults, especially in the structures of their hypopygia. But they are distinct from one another, and from other related species, in terms of their immature forms. The species from standing water has several black markings on the larval head capsule and a very long blade on the larval antenna. These features are unique among known species of this genus. Another species from running water is distinguishable from the other related species by means of the long pupal frontal seta, about 3 times as long as height of the cephalic tubercle, and the broad larval triangulum occipitale, distinctly visible in lateral view. These features are also unique among the known species of this genus. Therefore, the two species are described as new members of the genus *Dicrotendipes* in this paper on the basis of adult and immature forms.

SASA (1981) previously described *Dicrotendipes tamavidis* from Tokyo. Because his report was based on only one male specimen, it is necessary for the species to supplement morphological accounts and measurement data on the adult males. The male of *tamavidis* is redescribed in this paper, on the basis of many specimens from Shizuoka and Tochigi Prefectures. Descriptions of the adult female, pupa and larva are given here for the first time.

All the type specimens are deposited in the Department of Biology, Faculty of Education, Shizuoka University.

The terminology of the general morphology used in this paper follows

SAETHER (1980) and EPLER (1987, 1988).

Dicrotendipes nigrocephalicus sp. nov.

(Figs. 1, 2, 7, 10, 13, 16–18, 25, 26, 29, 30, 35, 38, 40)

Dicrotendipes nervosus: SASA & KIKUCHI, 1986, 19; SASA, 1993 a, 70.

Dicrotendipes flexus: SASA, 1985 a, 33; SASA, 1985 b, 113.

Male. Body length 3.1–4.4 mm. Wing length 1.7–2.8 mm.

Coloration largely green. Thorax reddish or yellowish brown on scutal vittae and preepisternum, blackish brown on postnotum. Front leg blackish brown on apex of femur, tibia and tarsus except basal 1/5 of tarsomere 1, which is pale brown. Middle and hind legs brown on tarsi except basal 1/4–1/3 of tarsomeres 1, which are yellow to yellowish green. Abdomen dark green on segments VII–IX or VIII–IX.

Head: Temporals 15–28 in number. Frontal tubercle well developed, 13–25 μm long, 5–13 μm wide. Antennal ratio 2.1–2.8. Clypeus with 9–19 setae. First to 5th palpal segment lengths in Table 1.

Thorax: Anteprenotum narrow and collar-like; median lobes scarcely projecting. Scutum with 7–16 acrostichals in 2 rows, 7–15 dorsocentrals in a row; tubercle weak. Supraalar and prealar calli with 1, 2–7 setae, respectively. Scutellum with 7–15 setae in a row, sometimes partially 2 rows.

Wing: Membrane unmarked. Vein R with 5–15 setae; R_1 with 0–5 setae, usually without setae; R_{4+5} with 2–5, usually 2 setae; fCu slightly beyond r-m, venarum ratio 1.1–1.2. Squama with 2–14 setae.

Legs: Bristle ratio 2.0–2.6 in front leg, 2.9–3.7 in middle leg, 4.2–5.7 in hind leg. Middle leg with 6–16 sensilla chaetica on tarsomere 1. Lengths of leg segments and leg ratios in Table 2.

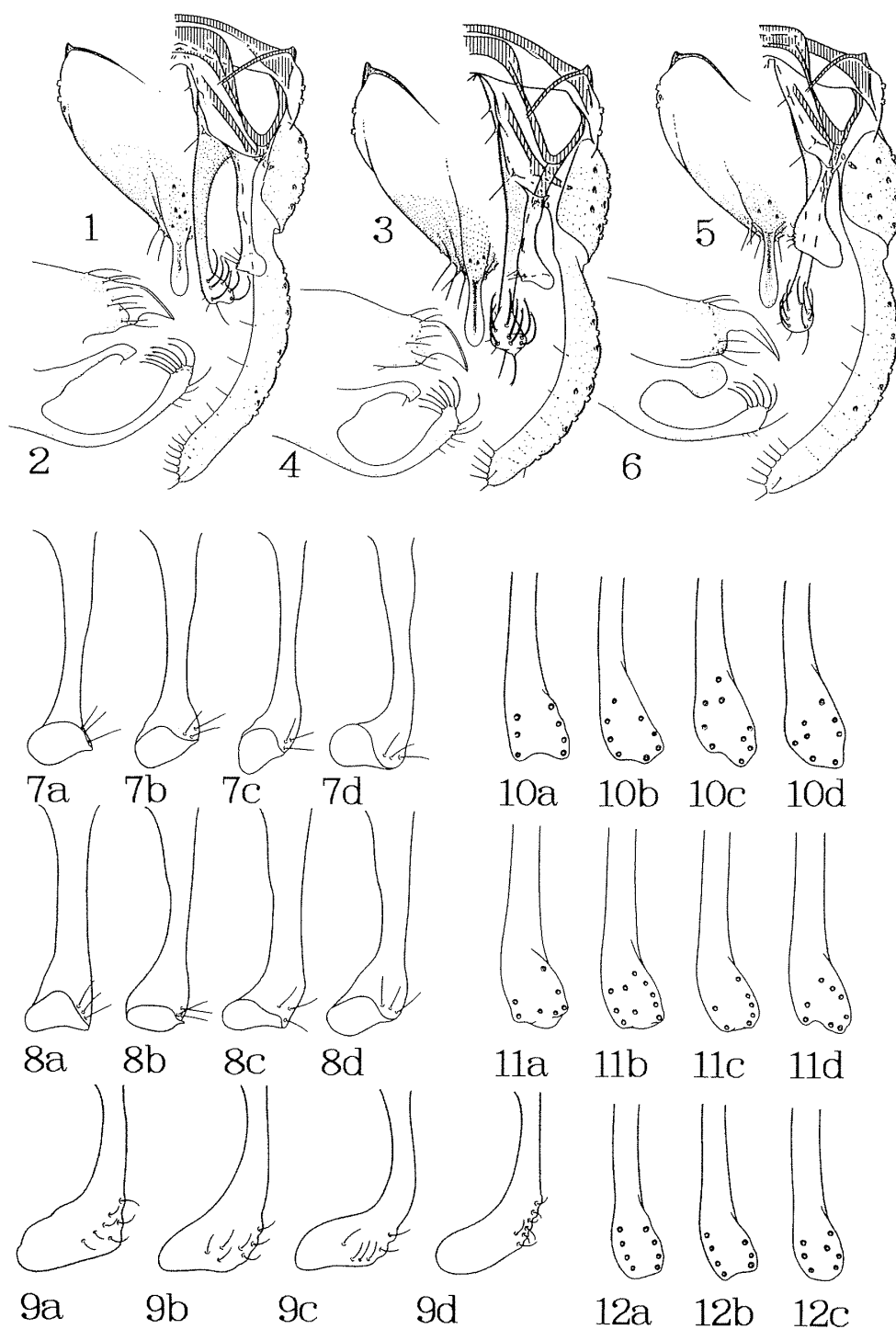
Abdomen: Sternite VI with 1–6 stout ventral accessory setae, occasionally VII with one ventral accessory seta.

Hypopygium (Figs. 1–2): Tergite IX without median setae; anal point broad and stout in lateral view. Gonostylus slender and arched. Superior volsella cylindrical, apically swelling and with 2–5, usually 3, short inner setae; shape of the swelling variable in dorsal or ventral view (Fig. 7a–d). Inferior volsella slender, curved dorsally, and apically clubbed; swelling portion usually indented at apex, but variable in shape (Fig. 10a–d), with 5–9 recurved setae dorsally in 2 rows, occasionally 3 rows or irregularly, and with 1–2 strong setae and 3–7 weak setae ventrally.

Female. Body length 2.9–3.8 mm. Wing length 2.1–2.8 mm.

Coloration similar to that of male.

Head: Antennal ratio 0.38–0.47; first to 5th flagellomere lengths in Table 3.



Figs. 1-12. Males of *Dicrotendipes*. — 1, 2, 7, 10, *D. nigrocephalicus* sp. nov.; 3, 4, 8, 11, *D. nipporivus* sp. nov.; 5, 6, 9, 12, *D. tamaviridis* SASA. — 1, 3, 5, Hypopygia (dorsal views); 2, 4, 6, abdominal terga IX with anal points, and both superior and inferior volsellae (lateral views); 7a-d, 8a-d, 9a-d, variation of superior volsellae (ventral views); 10a-d, 11a-d, 12a-c, variation of inferior volsellae (dorsal views).

Wing: Vein R with 13–22 setae; R_1 with 10–16 setae; R_{4+5} with 26–38 setae. Squama with 6–19 setae.

Legs: Tarsomere 1 of middle leg with 30–45 sensilla chaetica, of hind leg with 5–16 sensilla chaetica.

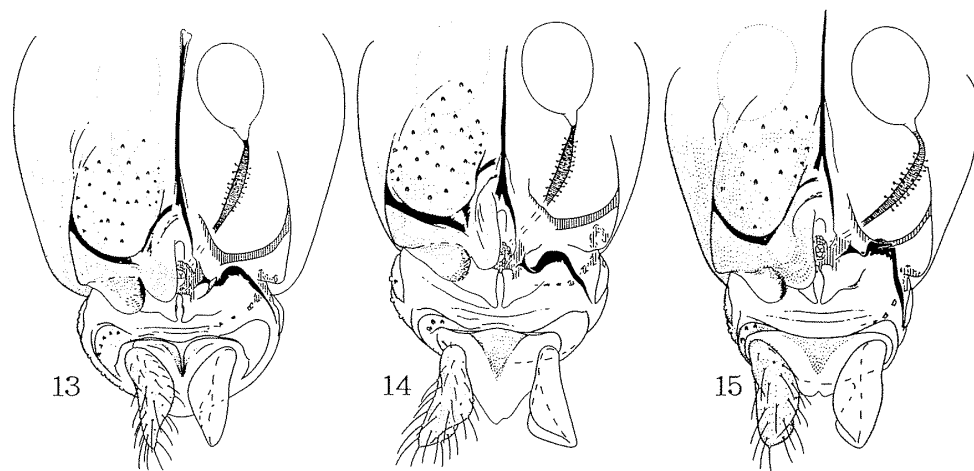
Abdomen: Sternite VI with or without one stout ventral accessory seta, VII with 4–6 ventral accessory setae.

Genitalia (Fig. 13): Sternite VIII with 20–31 setae on each side. Gonapophysis VIII divided into large dorsomesal lobe and ventrolateral lobe of nearly same size. Apodeme lobe narrow, with distinct microtrichia. Gonocoxite IX with 2–4 setae. Segment X with 5–7 setae on each side. Notum 175–213 μm long. Seminal capsule oval, 88–108 μm long, 65–75 μm wide, and with a triangular neck region; basal 1/2 of spermathecal duct narrow.

Pupa. Body length 3.4–5.3 mm.

Cephalothorax: Cephalic tubercle well developed, 33–83 μm high, 35–90 μm wide, and bearing a preapical frontal seta, which is relatively short, at most as long as height of the tubercle (Fig. 16). Dorsum of thorax strongly pebbled.

Abdomen (Fig. 17): Shagreen absent on tergites I and IX; weak shagreen present anterolaterally on tergites II–VII, and laterally on tergite VIII; strong shagreen present medially on tergites II–VI, and posteriorly on tergites II–V, usually these strong shagreen areas present in pairs, but sometimes fused into an extensive shagreen on each tergite. Tergite II with a row of 42–82 posterior hooklets. Conjunctives III/IV–V/VI with transverse rows of spinules. Sternites I–II with transverse rows of spines. Pedes suprii A strong on sternite IV, somewhat weak on V–VII. Pedes spurii B indistinct. Segment I without L-setae, II–IV with 3 short and simple L-setae, V–VIII with 4 long and lamelliform L-setae on each side. Segment VIII with sinuate caudolateral spurs,



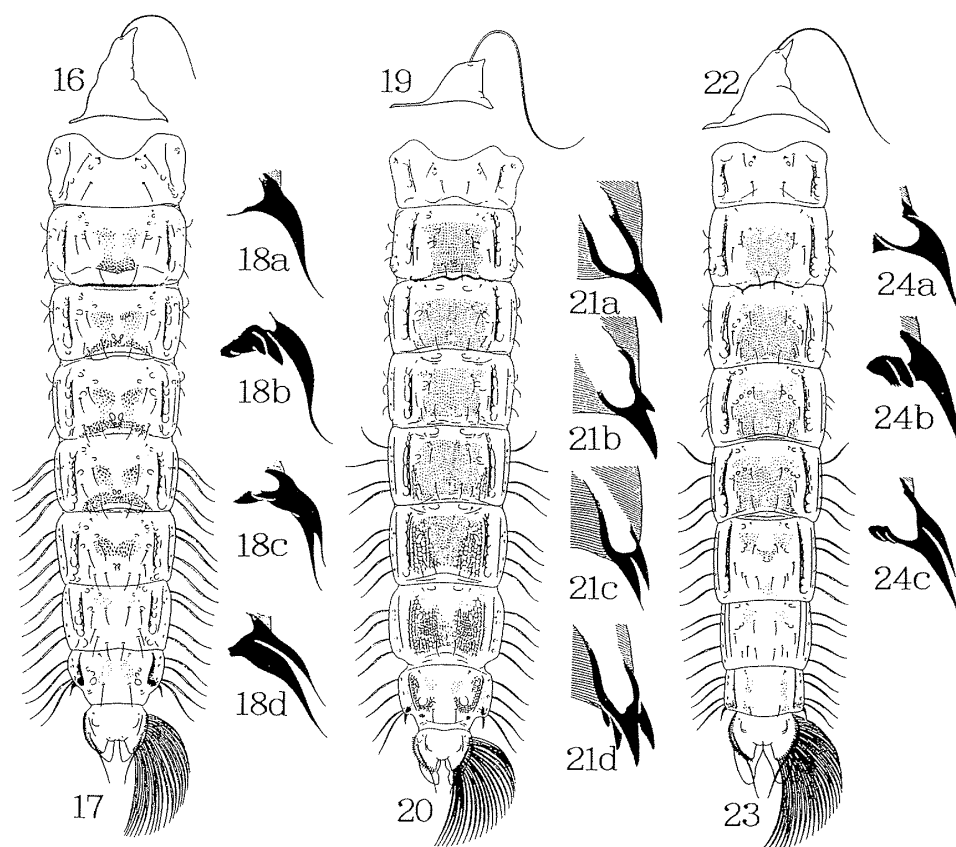
Figs. 13–15. Female genitalia of *Dicrotendipes*. — 13, *D. nigrocephalicus* sp. nov.; 14, *D. nipporivus* sp. nov.; 15, *D. tamaviridis* SASA.

which are usually simple, sometimes bifid, composed of 2 large spines, or of one large spine and few small spines (Fig. 18 a-d). Anal lobe with a fringe of 22–51 lamelliform setae.

Fourth instar. Body length 4.1–7.2 mm. Head capsule length 450–560 μm .

Body coloration largely red in life. Dark brown to black markings present on head capsule; frontal apotome with a linear marking mesially and a V-shaped marking along epicranial arms, lateral plate with a long and sagittary marking along epicranial suture and 5 short and linear markings, also antennal pedicel and postmentum largely dark brown to black.

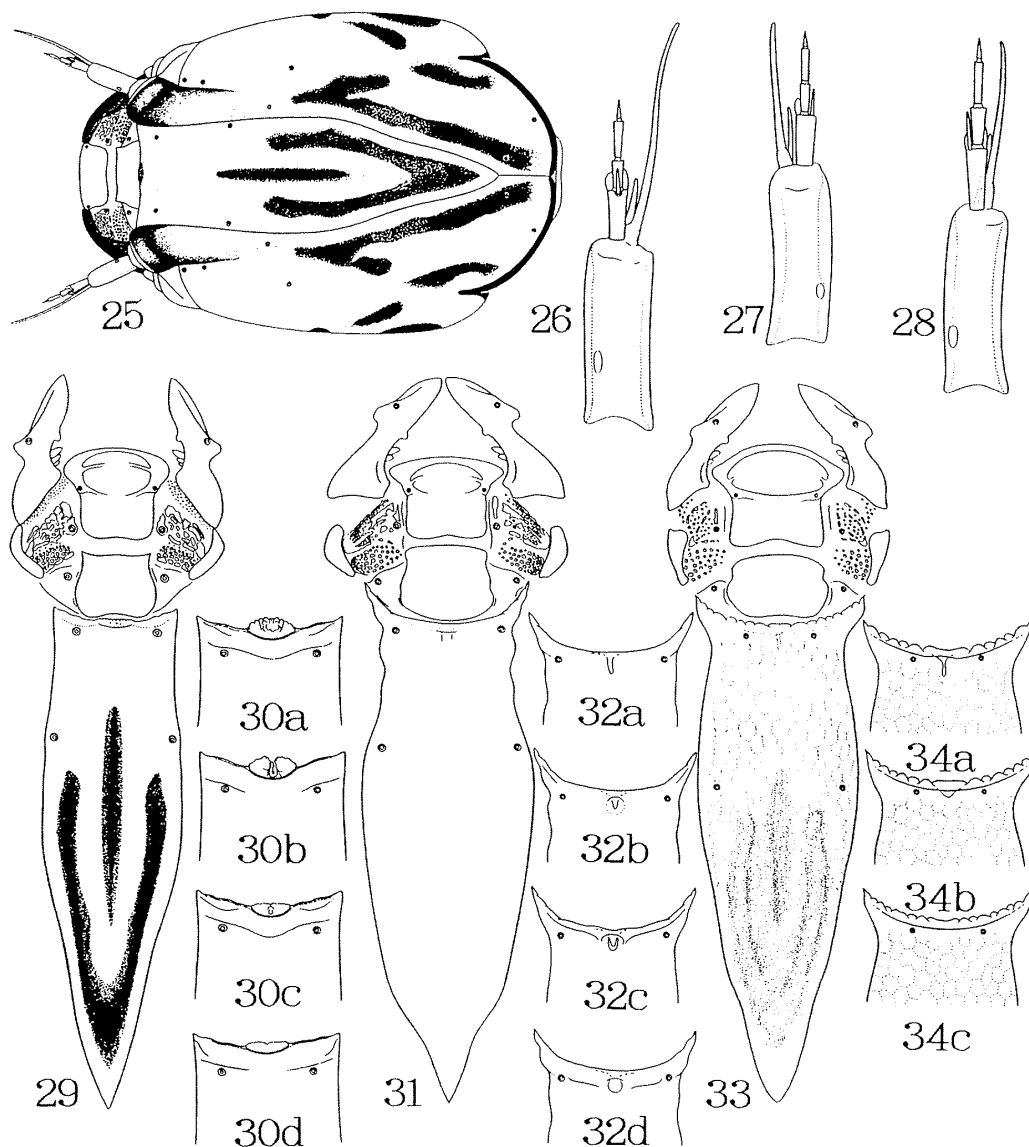
Head (Figs. 25, 29): Antenna (Fig. 26) with a ring organ on about basal 1/3 of segment I; blade extending far beyond apex of segment V, 55–73 μm long, and 1.6–2.0 times as long as flagellum; accessory blade 15–20 μm long, and 1.2–1.4 times as long as segment II; Lauterborn organ and style on apex of segment II 6–8 μm , 8–10 μm long, respectively. Antennal ratio 1.2–1.4; lengths of antennal segments in Table 4. Frontal apotome (Fig. 30a-d) weakly



Figs. 16–24. Pupae of *Dicrotendipes*. — 16–18, *D. nigrocephalicus* sp. nov.; 19–21, *D. nipporivus* sp. nov.; 22–24, *D. tamaviridis* SASA. — 16, 19, 22, Cephalic tubercles; 17, 20, 23, abdominal segments (dorsal views); 18a-d, 21a-d, 24a-c, variation of caudolateral spurs of abdominal segments VIII.

projected at anterolateral corners, and with a suboval frontal pit on anteromedian extension; frontal process variable in shape, occasionally absent. Mandible with 3 triangular inner teeth. Mentum (Figs. 35, 38a-c) with a median tooth and 5 pairs of lateral teeth; sometimes 5th lateral tooth fused with 4th, or reduced into rounded extension. Postmentum weakly to strongly rugose on middle.

Body (Fig. 40): Anal setae 8 in number. Ventral tubule absent. Four anal tubules well developed; ventrals gently curved ventrad.



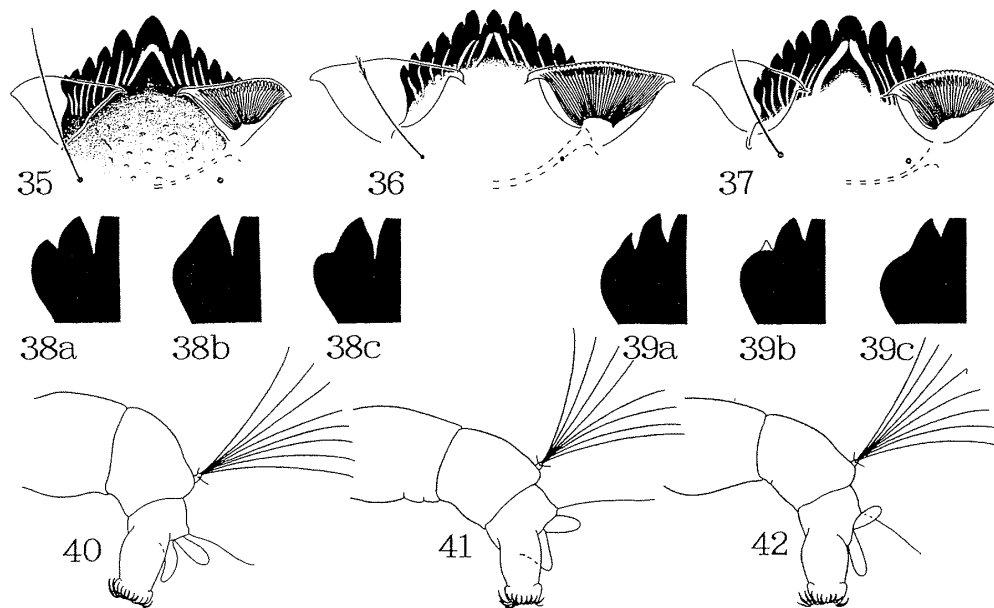
Figs. 25-34. Larvae of *Dicrotendipes*. — 25, 26, 29, 30, *D. nigrocephalicus* sp. nov.; 27, 31, 32, *D. nipporivus* sp. nov.; 28, 33, 34, *D. tamaviridis* SASA. — 25, Head capsule (dorsal view); 26-28, antennae; 29, 31, 33, dorsal sclerites of heads; 30a-d, 32a-d, 34a-c, variation of apical parts of frontal apotomes.

Specimens examined. Holotype: Male, emerged in the laboratory on 24. III. 1993 from a larva collected at a pond, Kujiragaike, in Shizuoka City, 19. II. 1993, and slide-mounted in Canada balsam with associated pupal and larval exuviae. Allotype: Female, emerged on 4. IV. 1993, same data as holotype. Paratypes: 2 larval exuviae, same locality as holotype, 29. X. and 5. XI. 1981; 4♂♂, 3♀♀, 2 pupal exuviae, 8 larvae (including 6 exuviae), same locality as holotype, 2. X. 1987 (adults emerged in the laboratory on 3. X. –14. X. 1987); 14♂♂, 7♀♀, 21 pupal exuviae, 15 larvae (including 10 exuviae), same data as holotype (adults emerged in the laboratory on 14. III.–4. IV. 1993); 1 pupal exuvium, 1 larval exuvium, a pond, Nomorinoike, in Kawane, Shizuoka Pref., 2. XI. 1981; 3 pupal exuviae, 3 larval exuviae, a pond, Futatsuike, in Shizuoka City, 3. X. 1983; 2♂♂, 2 pupal exuviae, 1 larval exuvium, a pond, Funatoike, in Shizuoka City, 28. X. 1984 (adults emerged in the laboratory on 12. I. –13. I. 1985); 4♂♂, Funatoike, 20. IV. 1988.

Distribution. Japan (Fukushima, Yamanashi, Shizuoka, Shiga, Tokushima, and Kagoshima Prefs.)

Remarks. *Dicrotendipes nigrocephalicus* much resembles *D. nervosus* and *D. flexus* in terms of adult morphology, especially in the structure of the male hypopygium, but differs from them in the following larval features: a head capsule with distinct black markings on the frontal apotome and lateral plates, and an antenna with a blade extending far beyond the terminal segment (in *nervosus* and *flexus*, a frontal apotome with at most a brown stripe, lateral plates without black marking except postmentum, and an antennal blade about as long as a flagellum, according to EPLER, 1987, 1988).

SASA (1989 a) distinguished *D. nervosus* from *D. flexus* by such characteristics of the male hypopygium as the coloration and shape of the anal point, the shapes of setae on the inferior volsella and on the apex of the gonostylus. But these characteristics may vary from one individual to another. The appearance of the anal point, too, in slide-mounted specimens varies largely due to mounting differences too (EPLER, 1987). The species reported under the name of *D. nervosus* from Tokushima (SASA & KIKUCHI, 1986) and Fukushima (SASA, 1993 a) Prefs. can not be separated from the species under the name of *D. flexus* from Kagoshima (SASA, 1985 a) and Yamanashi (SASA, 1985 b) Prefs. by the morphological features of male genitalia. These species also suit with the European and North American *nervosus* reported by many authors (EDWARDS, 1929; TOWNES, 1945; LEHMANN, 1971; PINDER, 1978; CONTRERAS-LICHTENBERG, 1986; EPLER, 1987) in such features of male adult as well-developed frontal tubercles, high value of antennal ratio, which is 2.19–2.75, and a distinctly indented apex of inferior volsella. Although redescriptions of these species reported from Japan were incomplete and all based on adults, it is obvious from the collecting records that their larvae



Figs. 35-42. Larvae of *Dicrotendipes*. — 35, 38, 40, *D. nigrocephalicus* sp. nov.; 36, 41, *D. nipporivus* sp. nov.; 37, 39, 42, *D. tamaviridis* SASA. — 35, 36, 37, Mentums; 38a-c, 39a-c, variation of outer lateral teeth of mentums; 40-42, posterior body segments (lateral views).

Table 1. Lengths of palpal segments in the males of *D. nigrocephalicus* sp. nov., *D. nipporivus* sp. nov. and *D. tamaviridis* SASA

	n	Segment				
		I	II	III	IV	V
<i>D. nigrocephalicus</i>	26	35-55 (47)	50-65 (58)	95-140 (124)	115-180 (156)	163-258 (223)
<i>D. nipporivus</i>	25	38-55 (45)	38-53 (45)	115-165 (137)	130-178 (156)	185-263 (217)
<i>D. tamaviridis</i>	17	33-48 (38)	33-50 (41)	98-138 (114)	105-140 (122)	168-215 (191)

Measurements in μm ; means in parentheses. n, Number of specimens examined.

inhabit standing water. Up to now I have not seen *nervosus* in Japan. As the result of comparative study on Japanese *Dicrotendipes*, I recognize that these two species are conspecific and should be given a new scientific name.

SASA and KAWAI (1987) reported *nervosus* from Lake Biwa in Shiga Pref. The report consists only of a collecting record without a morphological account. The species may in fact be *D. nigrocephalicus*, judging from my investigation of *nigrocephalicus* collected from the same lake on July, 1985.

Biological note. The larvae live in usually eutrophic, sometimes oligotrophic, ponds and lakes, and are frequently found in algae on submerged stones. The adults are commonly found from spring to autumn.

Dicrotendipes nipporivus sp. nov.

(Figs. 3, 4, 8, 11, 14, 19-21, 27, 31, 32, 36, 41)

Male. Body length 3.0–4.2 mm. Wing length 1.8–2.7 mm.Coloration similar to that of *nigrocephalicus*, but apical half of middle and hind tibiae brown.Head: Temporals 12–26 in number. Frontal tubercle usually small, 3–18 μm long, 5–8 μm wide. Antennal ratio 1.6–2.1. Clypeus with 14–31 setae. First to 5th palpal segment lengths in Table 1.

Thorax: Anteprenotum narrow; median lobes projecting forward. Scutum with 2 rows of 10–22 acrostichals and a row of 11–20 dorsocentrals; tubercle very weak. Supraalar and prealar calli with 1, 5–8 setae, respectively. Scutellum with 10–26 setae, which are located in a row on lateral, irregularly on middle.

Wing: Membrane unmarked. Vein R with 15–31 setae; R_1 with 8–19 setae; R_{4+5} with 9–23 setae; fCu slightly beyond r-m, venarum ratio 1.1–1.2. Squama with 6–19 setae.

Legs: Bristle ratio 1.8–3.2 in front leg, 2.6–4.3 in middle leg, 3.8–5.8 in hind leg. Middle leg with 6–17 sensilla chaetica on tarsomere 1. Lengths of leg segments and leg ratios in Table 5.

Abdomen: Sternite VI with 1–8 stout ventral accessory setae, occasionally V and VII with 1–2 ventral accessory setae.

Hypopygium (Figs. 3–4): Tergite IX without median setae; anal point relatively broad and stout in lateral view. Gonostylus slender and arched. Superior volsella cylindrical, apical swelling with 3, occasionally 4, short inner setae; shape of swelling variable in dorsal or ventral view (Fig. 8a-d). Inferior volsella slender, strongly curved dorsally, and apically clubbed; apical swelling usually projected roundedly, but variable in dorsal view of the shape (Fig. 11 a-d), with 5–10 recurved setae dorsally in 2–3 rows or irregularly, and with 2, occasionally 3, strong setae and 4–8 weak setae ventrally.

Female. Body length 2.4–3.3 mm. Wing length 2.0–2.9 mm.

Coloration similar to that of male.

Head: Antennal ratio 0.41–0.50; first to 5th flagellomere lengths in Table 3.

Wing: Vein R with 16–26 setae; R_1 with 10–28 setae; R_{4+5} with 25–44 setae. Squama with 10–26 setae.

Legs: Tarsomere 1 of middle leg with 27–38 sensilla chaetica, of hind leg without sensilla chaetica.

Abdomen: Sternite VI with 0–2 stout ventral accessory setae, VII with 4–8 ventral accessory setae.

Genitalia (Fig. 14): Sternite VIII with 30–35 setae on each side. Gonapophysis VIII divided into large dorsomesal lobe and ventrolateral lobe of nearly

Table 2. Lengths of leg segments and leg ratios in the male of *D. nigrocephalicus* sp. nov.

	Coxa	Trochanter	Femur	Tibia	Tarsomere 1
Front legs	150–245 (217)	110–170 (152)	640–960 (882)	490–800 (720)	840–1380 (1224)
Middle legs	210–355 (317)	100–150 (131)	600–910 (834)	530–800 (731)	320–485 (431)
Hind legs	220–320 (289)	95–150 (123)	670–1030 (936)	700–1200 (1041)	500–800 (707)
	Tarsomere 2	Tarsomere 3	Tarsomere 4	Tarsomere 5	Leg ratio
Front legs	390–605 (542)	325–525 (467)	255–405 (361)	120–190 (171)	1.60–1.80 (1.70)
Middle legs	170–260 (228)	115–165 (148)	70–110 (95)	70–100 (87)	0.55–0.61 (0.59)
Hind legs	265–410 (359)	225–335 (291)	120–185 (154)	85–130 (111)	0.65–0.71 (0.68)

Measurements in μm ; means in parentheses. Data based on 26 specimens.

Table 3. Lengths of flagellomeres of antennae in the females of *D. nigrocephalicus* sp. nov., *D. nipporivus* sp. nov. and *D. tamaviridis* SASA

	n	Flagellomere				
		I	II	III	IV	V
<i>D. nigrocephalicus</i>	11	105–130 (120)	70–85 (79)	78–93 (85)	78–98 (87)	141–173 (156)
<i>D. nipporivus</i>	8	95–130 (110)	55–73 (64)	63–85 (72)	68–88 (76)	128–175 (149)
<i>D. tamaviridis</i>	9	93–118 (103)	63–78 (69)	66–83 (74)	58–78 (65)	123–180 (139)

Measurements in μm ; means in parentheses. n, Number of specimens examined.

same size. Apodeme lobe very narrow, with distinct microtrichia. Gonocoxite IX with 2–4 setae. Segment X with 3–4 setae on each side. Notum 125–208 μm long. Seminal capsule oval, 93–100 μm long, 63–75 μm wide, and with a triangular neck region; basal 1/2 of spermathecal duct narrow.

Pupa. Body length 3.5–5.2 mm.

Cephalothorax: Cephalic tubercle relatively small, 13–20 μm high, 28–60 μm wide, and bearing a preapical frontal seta, which is about 3 times as long as height of the tubercle (Fig. 19). Dorsum of thorax strongly pebbled.

Abdomen (Fig. 20): Shagreen absent on tergites I and IX, more or less strong and extensive on tergites II–VI, and weakened anterolaterally on tergites VII–VIII; shagreen area on tergite VI triangular; strong reticulation present laterally on tergites IV–VI, and VIII, more extensively on VII. Tergite II with a row of 49–98 posterior hooklets. Conjunctive III/IV with or without sparse spinules on middle, IV/V–V/VI always with transverse rows of spinules. Sternites without transverse rows of spines. Pedes suprii A strong on sternite IV, weak on V–VII. Pedes spurii B distinct on segment II. Segment I without L-setae, II–IV with 3 short and simple L-setae, V–VIII with 4 long and lamelliform L-setae on each side. Segment VIII with stout and nearly straight caudolateral spurs, which are usually simple, sometimes bifid, or composed of several spines (Fig. 21a-d). Anal lobe with a fringe of 16–36 lamelliform setae.

Table 4. Lengths of antennal segments in the larvae of *D. nigrocephalicus* sp. nov., *D. nipporivus* sp. nov. and *D. tamaviridis* SASA

	n	Segment				
		I	II	III	IV	V
<i>D. nigrocephalicus</i>	33	40-55 (47)	10-16 (13)	6- 9 (7)	9-14 (10)	4-6 (5)
<i>D. nipporivus</i>	16	43-55 (50)	13-16 (14)	8- 9 (8)	9-12 (10)	5-6 (5)
<i>D. tamaviridis</i>	14	45-53 (48)	15-20 (17)	9-11 (10)	10-13 (11)	5-6 (6)

Measurements in μm ; means in parentheses. n, Number of specimens examined.

Table 5. Lengths of leg segments and leg ratios in the male of *D. nipporivus* sp. nov.

	Coxa	Trochanter	Femur	Tibia	Tarsomere 1
Front legs	170-240 (211)	120-190 (155)	675- 940 (816)	490- 730 (631)	970-1310 (1118)
Middle legs	230-380 (303)	105-145 (123)	640- 910 (779)	570- 835 (708)	340- 450 (396)
Hind legs	230-350 (293)	100-140 (119)	730-1060 (890)	800-1180 (978)	560- 810 (683)
	Tarsomere 2	Tarsomere 3	Tarsomere 4	Tarsomere 5	Leg ratio
Front legs	490-600 (533)	400-510 (441)	345-430 (382)	155-200 (176)	1.65-1.85 (1.74)
Middle legs	205-290 (246)	135-200 (166)	85-125 (106)	75-100 (86)	0.53-0.62 (0.56)
Hind legs	310-435 (361)	240-330 (288)	140-195 (166)	95-130 (111)	0.67-0.73 (0.70)

Measurements in μm ; means in parentheses. Data based on 25 specimens.

Fourth instar. Body length 4.7-6.9 mm. Head capsule length 400-540 μm .

Body coloration largely red in life. Dark markings absent on postmentum except mentum.

Head (Fig. 31): Antenna (Fig. 27) with a ring organ on about basal 1/3 of segment I; blade 33-45 μm long, and 0.9-1.1 times as long as flagellum; accessory blade 15-20 μm long, and 1.2-1.4 times as long as segment II; Lauterborn organ and style on apex of segment II 5-6 μm , 6-9 μm long, respectively. Antennal ratio 1.1-1.5; lengths of antennal segments in Table 4. Frontal apotome (Fig. 32a-d) almost smooth at anterior margin, and with strongly projected anterolateral corners; frontal pit oval, distinct or indistinct; frontal-process present, variable in shape. Mandible with 3 triangular inner teeth. Mentum (Fig. 36) with a median tooth and 6 pairs of lateral teeth; 2nd lateral tooth partly fused with 1st lateral. Postmentum with branched setae submenti. Triangulum occipitale broad, with an altitude which is about half as long as base.

Body (Fig. 41): Anal setae 8 in number. Ventral tubule absent. Four anal tubules well developed; ventrals somewhat conical.

Specimens examined. Holotype: Male, emerged in the laboratory on 7. V. 1991 from a larva collected at the Fuji River in Shizuoka Pref., 29. IV. 1991, and slide-mounted in Canada Balsam with associated pupal and larval exuviae.

Allotype: Female, emerged on 13. V. 1991, and slide-mounted with associated pupal exuvium, other data the same as holotype. Paratypes: 2♂♂, 2 pupal exuviae, same data as holotype (adults emerged on 7. V. and 9. V. 1991); 1♀, the Stream Nagasawagawa in Shizuoka City, 5. IX. 1983; 3♂♂, 1♀, 3 pupal exuviae, 11 larvae (including 4 exuviae), the Stream Nagasawagawa, 28. X. 1984 (an egg-mass collected and cultured in the laboratory, and adults emerged on 3. XII–15. XII. 1984); 13♂♂, 1♀, 4 pupal exuviae, 7 larvae (including 4 exuviae), the Stream Shiotagawa in Shimizu City, Shizuoka Pref., 29. IV. 1985 (adults emerged in the laboratory on 1. V.–20. V. 1985); 1♀, 1 pupal exuvium, 1 larval exuvium, the Stream Marikogawa in Shizuoka City, 19. III. 1985 (adults emerged in the laboratory on 25. III. 1985); 1 pupal exuvium, the Stream Iharagawa in Shimizu City, 16. VI. 1989; 1♂, the Stream Opisagawa in Iwaki City, Fukushima Pref., 16. VIII. 1991; 5♂♂, the Stream Genpeigawa in Mishima City, Shizuoka Pref., 20. IV. 1993; 2♂♂, 3♀♀, the Stream Genpeigawa, 24. IV. 1994; 3♂♂, the Stream Genpeigawa, 10. VII. 1994.

Distribution. Japan (Shizuoka and Fukushima Prefs.)

Remarks. The adults of *Dicrotendipes nipporivus*, *D. nervosus*, *D. flexus* and *D. nigrocephalicus* are quite similar to one another in terms of the structures of their male hypopygia. The pupa of *nipporivus* greatly resembles that of *nervosus* in the relatively extensive shagreen on the abdominal tergites II–VI and the reticulation on posterior tergites. The larva of *nipporivus* resembles that of *flexus* in the mentum bearing the second lateral tooth closely approximated to the first. But *D. nipporivus* is distinct from these in its characteristic pupal frontal seta, about 3 times as long as height of the cephalic tubercle, and its broad larval triangulum occipitale. These features clearly distinguish *nipporivus* from the other related species, including *nigrocephalicus*.

SASA (1989b) collected many adult males on light trap at the side of the Ureshino River in Saga Pref. and reported them under the name of *D. flexus*. They obviously occur from the river and their morphological features somewhat correspond to those of *nipporivus*. But it is uncertain whether they are *nipporivus* or not, since they have a high value of antennal ratio 2.20–2.60, which closely accords with that of *nigrocephalicus*.

Biological note. The larvae live in clear streams and rivers, and are frequently found in algae and mosses on stones and slabs of concrete submerged in rapid streams. The adults emerge in spring to autumn, and may commonly be found in riverine bushes.

Dicrotendipes tamaviridis SASA

(Figs. 5, 6, 9, 12, 15, 22–24, 28, 33, 34, 37, 39, 42)

Dicrotendipes tamaviridis SASA, 1981, 99.

Dicrotendipes okiyonaensis SASA, 1993 b, 126.

Male. Body length 2.5–3.3 mm. Wing length 1.5–1.9 mm.

Coloration largely green. Thorax reddish or yellowish brown on scutal vittae, slightly brown on postnotum. Front leg brown on apex of femur, tibia and tarsus. Middle and hind legs brown on tarsi except basal 1/3–2/3 of tarsomeres 1, which are yellow to yellowish green. Abdomen dark green on segments VII–IX.

Head: Temporals 11–20 in number. Frontal tubercle usually small, 3–10 μm long, 3–5 μm wide. Antennal ratio 1.9–2.3. Clypeus with 13–22 setae. First to 5th palpal segment lengths in Table 1.

Thorax: Anteprenotum narrow; median lobes slightly projecting forward. Scutum with 8–15 acrostichals in 2 rows, 5–9 dorsocentrals in a row; tubercle weak. Supraalar and prealar calli with 1, 1–4 setae, respectively. Scutellum with 6–7 setae in a row.

Wing: Membrane unmarked. Vein R with 11–19 setae; R_1 with 6–12 setae; R_{4+5} with 6–17 setae; fCu slightly beyond r-m, venarum ratio 1.1–1.2. Squama with 1–3 setae.

Legs: Bristle ratio 1.9–3.0 in front leg, 2.8–4.4 in middle leg, 4.2–6.7 in hind leg. Middle leg with 3–8 sensilla chaetica on tarsomere 1. Lengths of leg segments and leg ratios in Table 6.

Abdomen: Sternite VI with 2–7 stout ventral accessory setae.

Hypopygium (Figs. 5–6): Tergite IX without median setae; anal point relatively slender and tapering towards apex in lateral view. Gonostylus slender and arched. Superior volsella pediform, apical swelling membranous, with 6–9 short inner setae; shape of swelling variable in dorsal or ventral view (Fig. 9 a-d). Inferior volsella slender, gently curved dorsally, and apically clubbed; apical swelling slightly indented mesially, but somewhat variable in shape (Fig. 12a-c), with 5–8 recurved setae dorsally in 2, occasionally 3 rows, and with one

Table 6. Lengths of leg segments and leg ratios in the male of *D. tamaviridis* SASA

	Coxa	Trochanter	Femur	Tibia	Tarsomere 1
Front legs	130–190 (164)	100–140 (125)	640–850 (756)	450–605 (516)	830–1110 (957)
Middle legs	200–270 (232)	85–110 (98)	565–720 (633)	490–650 (556)	280– 370 (314)
Hind legs	200–270 (228)	90–110 (96)	630–820 (718)	670–910 (779)	460– 620 (523)
	Tarsomere 2	Tarsomere 3	Tarsomere 4	Tarsomere 5	Leg ratio
Front legs	420–585 (495)	335–470 (400)	260–375 (313)	140–180 (159)	1.80–1.92 (1.86)
Middle legs	150–210 (176)	105–140 (117)	60– 80 (72)	60– 70 (62)	0.53–0.60 (0.57)
Hind legs	210–300 (253)	185–255 (217)	110–155 (127)	75–100 (87)	0.65–0.69 (0.67)

Measurements in μm ; means in parentheses. Data based on 17 specimens.

strong seta and 3–5 weak setae ventrally.

Female. Body length 2.0–2.6 mm. Wing length 1.4–2.1 mm.

Coloration similar to that of male.

Head: Frontal tubercle small or absent. Antennal ratio 0.40–0.52; first to 5th flagellomere lengths in Table 3.

Wing: Vein R with 12–20 setae; R_1 with 13–22 setae; R_{4+5} with 20–28 setae. Squama with 1–3 setae.

Legs: Tarsomere 1 of middle leg with 13–20 sensilla chaetica, of hind leg without sensilla chaetica.

Abdomen: Sternite VI with 0–1 stout ventral accessory seta, VII with 4–5 ventral accessory setae.

Genitalia (Fig. 15): Sternite VIII with 12–17 setae on each side. Gonapophysis VIII divided into large dorsomesal lobe and ventrolateral lobe of nearly same size. Apodeme lobe very narrow, with distinct microtrichia. Gonocoxite IX with one, occasionally 2 setae. Segment X with 1–4, usually 3 setae on each side. Notum 113–155 μm long. Seminal capsule oval, 88–100 μm long, 63–70 μm wide, and with a triangular neck region; basal 1/2 of spermathecal duct narrow.

Pupa. Body length 2.9–4.1 mm.

Cephalothorax: Cephalic tubercle well developed, 30–60 μm high, 33–83 μm wide, and bearing a preapical frontal seta, which is somewhat longer than height of the tubercle (Fig. 22). Dorsum of thorax strongly pebbled.

Abdomen (Fig. 23): Shagreen absent on tergites I and IX; strong shagreen present extensively on tergites II–V, medially on tergite VI; weak shagreen present anterolaterally on tergites III–VII, posteromedially on tergite VI, laterally on tergite VIII; sometimes weak shagreen on tergites III–V merged into median large shagreen, and on tergite VIII separated into anterolaterals and posterolaterals. Tergite II with a row of 67–111 posterior hooklets. Conjunctives IV/V and V/VI with transverse rows of spinules. Sternites without transverse rows of spines. Pedes suprii A strong on sternite IV, weak on sternites V–VI, occasionally VII. Pedes spurii B small on segment II. Segment I without L-setae, II–IV with 3 short and simple L-setae, V–VIII with 4 long and lamelliform L-setae on each side. Segment VIII with straight to somewhat sinuate caudolateral spurs, which are usually simple, sometimes composed of 2 large spines, or of one large spine and few small spines (Fig. 24 a-c). Anal lobe with a fringe of 24–39 lamelliform setae.

Fourth instar. Body length 4.6–5.1 mm. Head capsule length 450–520 μm .

Body coloration largely red or yellow in life. Head capsule brown on about posterior 2/3 of frontal apotome and on postmentum along postoccipital margin; frontal apotome sometimes with a linear and a V-shaped fuscous markings.

Head (Fig. 33): Head capsule largely with reticulation, which is strong at least on frontal apotome and postmentum. Antenna (Fig. 28) with a ring organ on about basal 1/3 of segment I; blade 35–48 μm long, and 0.8–1.1 times as long as flagellum; accessory blade 20–23 μm long, and 1.1–1.3 times as long as segment II; Lauterborn organ and style on apex of segment II 5–6 μm , 10–13 μm long, respectively. Antennal ratio 1.0–1.2; lengths of antennal segments in Table 4. Frontal apotome (Fig. 34 a-c) strongly projected at anterolateral corners, and strongly serrated at anterior margin; frontal pit indistinct, frontal process peg-like or triangular in shape, occasionally absent. Mandible with 3 triangular inner teeth. Mentum (Figs. 37, 39 a-c) with a median tooth and 6 pairs of lateral teeth; sometimes 5th lateral tooth reduced into minute pale tooth or rounded extension.

Body (Fig. 42): Anal setae 8 in number. Ventral tubule absent. Two pairs of anal tubules well developed and digitiform.

Specimens examined. 7♂♂, a pond, Yanbaratsutsumi, in Shimizu City, Shizuoka Pref., 8. IX. 1984; 1♀ with associated pupal and larval exuviae, Yanbaratsutsumi, 15. XII. 1984 (adult emerged in the laboratory on 20. XII. 1984); 10♂♂, 8♀♀, 27 pupal exuviae, 13 larvae (including 5 exuviae), a fire-proof pool in Ichikai, Tochigi Pref., 5. V. 1989 (an egg-mass collected and cultured in the laboratory, and adults emerged on 3. VII–20. VII. 1989); 2♂♂, a small spring in Shizuoka City, 5. VI. 1994 (adults emerged in the laboratory on 18. VI. 1994).

Distribution. Japan (Tokyo, Tochigi, Shizuoka and Okinawa Prefs.)

Remarks. *Dicrotendipes tamaviridis* resembles *D. neomodestus* in terms of the structures of the male hypopygium and dorsal shagreen of pupal abdomen. Further, the larvae of these species are similar to one another in the reticulated frontal apotome. But *D. tamaviridis* differs from *D. neomodestus* in such features of immature forms as the pupa without rows of spines on the abdominal sternites (abdominal sternites I–III with transverse rows of spines in *neomodestus*, according to EPLER, 1987), and the larva with the second lateral tooth well separated from the first lateral tooth in the mentum (the second lateral tooth almost completely fused or approximated to the first lateral tooth in *neomodestus*).

SASA (1993 b) collected a male at the side of a dam on the Yona River in Okinawa island, and described it under the name of *Dicroendipes okiyonaensis*, saying, “it is most closely related to *D. tamaviridis* SASA, 1981, but differs from the latter in that dorsal appendage is not distally expanded, and ventral appendage is longer and with a long seta at its base”. The species, however, is regarded as a junior synonym of *tamaviridis*, since the appearances of dorsal and ventral appendages somewhat vary due to mounting difference in a slide-mounted specimen, and the basal seta of ventral appendage pointed out by SASA

is one of marginal setae of gonocoxite.

Biological note. The larvae live in ponds and lakes, and occasionally in fire-proof pools. The adults appear sporadically through all seasons.

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A New Host Record of *Erechthias itoi* (Lepidoptera, Tineidae)

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MORIUTI and KADOHARA (1994) revised the Japanese Erechthiinae of the family Tineidae and recognized two genera and seven species, in which they described *Erechthias itoi* as a new species and the host was said to be unknown. However, in this paper we record the host plant for the first time as shown below. As *Erechthias itoi* was described on the basis of a pair of rubbed specimens from Titijima Island., Ogasawara Islands, the description of adult is not perfect as they mentioned. Fortunately we could get seven adult specimens of this moth. Therefore we will give the photographs of male and female with description of some characters where they could not observe well.

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