A new species of the genus *Cnetha* from Hokkaido, Japan with redescription of *Cnetha konoi* (Takahasi, 1950) (Diptera, Simuliidae)*\(^1\)

Hiroshi Ono*

*Nukabira Biological Institute, Obihiro University, Nukabira, Kamishiho, Hokkaido 080-15, Japan*

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**Abstract:** *Cnetha rebunense* n. sp. collected from the streams of Ohosawa River in the Rebun Island of Hokkaido is described and illustrated. This new species which seems to be assigned to the *ruficorne*-group of Crosskey(1966) is easily distinguished from *C. konoi* and the other members of the genus *Cnetha* by the features of genitalia in both sexes. The female adult, pupa and larva of the allied species, *C. konoi* (Takahasi, 1950), are also described with the redescription of the male adult and cocoon. *C. konoi* is apparently assigned to the *vernun*-group of Crosskey and Davies (1972).

In July 25, 1977, a large number of the larvae and pupae of a *Cnetha*-species were collected from slow streams of Ohosawa River in the Rebun Island of Hokkaido. For correlation of the larvae with pupae, some full-grown larvae collected and preserved from the same batch as the pupae. The reared adults associated pupal skins and larvae are allied to those of *Cnetha konoi* (Takahasi, 1950) (=*Nevermannia konoi* Takahasi). However, the present specimens can be distinguished from the latter by the several taxonomic characters pointed out later, and also from any other known species of the genus. Therefore the author described this species as a new. Additionally, *C. konoi* is redescribed by the materials which were collected from several streams in the Daisetsu National park and Hidaka Range of Hokkaido, because female, pupa and larvae of this species have not been known up to the present.

**DESCRIPTION**

*Cnetha rebunense* Ono, n. sp.

(Figs. 1-26)

[Japanese name: Rebun-hosusune-buyu]

**Female.** Length: body, 2.60-2.80 mm; wing, 2.30-2.60 mm. General body colour black; legs greyish yellow.

Head black, slightly narrower than thorax, posterior and undersurface densely covered with short yellow hairs; a row of stout, erect, long brown hairs along posterior and lateral margins of eye. Frons (Fig. 9) black, narrowed towards antennal base with short, fine recumbent and greyish silver hairs; \(a:b:c=1.5:1:2.5\) (a: greatest width of frons, b: narrowest width of frons and c: height of frons, cf. Fig. 9). Clypeus grey, longer than width with dense silver grey pubescence. Antenna (Fig. 2) composed of 2+9 segments; scape and pedicel brown with fringe of black hairs on each distal margin; flagellum black with dense greyish pubescence; first segment larger than the other segments. Maxillary palp (Fig. 4) greyish black, covered with grey hairs; proportional length of each segment from base to apex.

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\(^1\) Contribution No. 86 from the Laboratory of Entomology, Obihiro University.

*小野 秋： 希谷畜産大学生物研究所（〒080-15 北海道恵庭市上塚町幡平）*
15:15:37:34:75; segment III elliptical enlarged, about 2.5 times as wide as the following one; sensory vesicle elliptical, about twice as long as width and about 2/3 as long as respective segment, proximally situated. Maxilla (Fig. 6) with 20 (9 inner teeth and 11 outer ones) retrorse teeth. Mandible (Fig. 7) with about 42-43 (12-13 outer teeth and about 30 week inner ones) fine serration. Median distal margin of cibarium (Fig. 8) broadly flattened; dorsolateral arms short, slender, outwardly curved and strongly sclerotized.

Thorax black. Pronotum and prescutum black, covered with long, fine recumbent and greyish silver hairs. Scutum black, covered with short, fine recumbent and golden yellow hairs. Scutellum black, with long, recumbent golden yellow hairs and with a row of stout, erect and long black hairs along posterior and lateral margin of scutellum. Post-scutellum black and bare. Pleural membrane and katapiphrenum greyish black and bare; pleural tuft pale brown. Wing hyaline; veins grey. Costa with fine dark hairs, interspersed with usually well-developed spinules. Ventral surface of subcosta with 2 rows of hairs. Radius with basal section fully haired. R with a single row of 7-8 short hairs on distal 1/2. CuSshaped. Basal cell absent. Fringe of calypter and alar lobe grey. Halter pale yellow, with fringe of short pale yellow hairs. All coxae and trochanters grey with short pale yellow hairs. All femora greyish yellow, covered with short greyish silver hairs; fore and mid femora with distal ends black; hind femur dilated with distal 1/4 black, about 3.8 times as long as its greatest width (Fig. 11). All tibiae greyish yellow, covered with short greyish silver hairs; fore and mid tibiae with distal 1/3 black; hind tibia with distal 1/2 black and considerably swollen, about 3.5 times as long as its greatest width. Fore and mid tarsi black, covered with short black hairs. Fore basitarsus cylindrical, not dilated and about 8 times as long as its width. Hind basitarsus greyish yellow, covered with short greyish silver hairs and distal 1/2 black, flat and nearly parallel-sided and about 1.5 times as long as the remaining tarsal segments together; the remaining segments black and with short black hairs. Calcipala of moderate size with long black bristles and extending to pedisulcus; pedisulcus marked and placed at basal 1/3 of 2nd segment (Fig. 13). Each claw gently curved with a large basal tooth (Fig. 12).

Abdomen dull black, lighter and often browned on anterolateral and ventral surfaces, sparsely covered with short, erect and greyish silver hairs; terga VII and VIII with long, erect and brown hairs. Basal scale pale yellow; basal fringe pale yellow, longer laterally. Genitalia as shown in Fig. 14 (a, b). Paraproct narrow dorsally, broadly rounded on the anteroventral margin, semicircular in lateral view and mitre-shaped in ventral view; moderately setose. Cercus long oval-shaped in ventral view, rounded apically; subquadrate in lateral view; anterior part strongly setose and posterior part poorly setose. Anterior gonapophyses simple, with 5 macrosetae as well as numerous microsetae; inner margin heavily sclerotized and concave; posterior margin convex and somewhat transparent. Genital fork usually Y-shaped, with long, strongly sclerotized stem and widely expanded arms; distal expansion of arm nearly triangular with strongly sclerotized blunt projection on its proximal surface; inner margin of arm heavily sclerotized. Spermatheca ellipsoidal approximately 1.2 times as long as its greatest width; its surface strongly sclerotized, without reticulate pattern and internal hairs.

**Male.** Length: body, 2.45-2.65 mm; wing, 2.25-2.45 mm. General body colour darker than that of female, black; legs uniformly black.

Head black, wider than thorax; posterior and undersurface of head, frons with long black hairs. Clypeus half shiny, blackish brown with sparse long dark hairs. Holoptic, upper faceties reddish orange, lower ones dull brown in living examples; upper faceties with about 18 transverse rows. Antenna (Fig. 1) entirely black; first flagellomere elongate, about 2.2 times as long as the following one. Maxillary palp (Fig. 3) black with 5 segments in proportion of 3:3:7:8:19-20; sensory vesicle very small, globular in shape and proximally situated.

Pronotum and scutum velvet black and
covered with long, fine and recumbent golden hairs. Scutellum black with long recumbent golden hairs and with a row of stout, erect and very long hairs along posterior and lateral margin of scutellum. Postscutellum, pleural membrane and katepisternum half shiny, black and bare. Wing as in female, excepting its size. Halter brown; stem dull brown, fringe with short and pale yellow hairs. All coxae and trochanters black with long black hairs. All femora and tibiae with sparse and long black hairs; hind femur and tibia strongly dilated, each segment about 3 times as long as its greatest width. Fore and mid basitarsi cylindrical, and fore one about 4.5 times as long as width; hind basitarsus swollen, spindle-shaped, about 2.5 times as long as its greatest width and more slender than tibia.

Abdomen velvety black, with sparse and minute pale yellow hairs. Basal scale brown; basal fringe black, longer laterally. Genitalia as shown in Fig. 15 (a, b, c, d, e). Coxite conic quadrate, its maximum width about equal to maximum length; considerably setose. Style short, boot-shaped, twisted inward, about 2/3 as long as coxite; its truncate apex with 1 long, stout apical spine; considerably setose. Ventral plate discus-shaped, wider than length, broadly rounded ospterialy, having hairy notch on posterior margin; median part with a broad carina, bluntly projecting ventrally; anterior margin slightly concave; basal arm short, sclerotized and clearly bent outwardly. Median sclerite long and slender; moderately broad at distal

Figs. 1–9 Cnetha rebunense n. sp. (adults)
1, antenna of male; 2, antenna of female; 3, maxillary palp of male; 4, maxillary palp of female; 5, sensory vesicle of female; 6, maxilla of female; 7, mandible of female; 8, distal part of cibarium of female; 9, frons of female

Figs. 10–14 Cnetha rebunense n. sp. (adults)
10, fore, mid and hind legs of male; 11, legs of female; 12, claw; 13, calcipala and pedisulcus of female; 14a, genitalia of female, ventral view; 14b, paraproct and cercus, lateral view
end, furcating in Y-shaped; arms short. Endparameral organ slender and with a short parameral hook on the anterior margin of each side.

**Pupa.** Length 2.55–2.85 mm (excluding respiratory filaments). Respiratory organ (Fig. 16) 2.35–2.55 mm, consisting of 4 filaments on each side arranged in the following manner; base long, tinged with brownish yellow, covered with many spicules and connected to stem; stem long, brownish yellow and branched into 2 long trunks, usually extending in a vertical plane at the angle of 45 degrees or less; length of 2 trunks variable, but ventral trunk usually longer than dorsal one; each trunk divided again into 2 filaments as shown in Fig. 16; all filaments greyish brown, tapered towards tip with numerous minute greyish granules and transverse deep furrows. The integument of head and thorax brown with numerous and ring-like granules dorsally. Head trichomes 3 pairs, all long and simple. Thoracic trichomes 2 simple pairs dorsally and 3 simple pairs laterally; all long. Female antenna reaching to hind margin of head; male one extending about 2/3 distance to hind margin of head. Abdominal segment consist of transparent thin skins except pale brownish tergum IX. Terga I and II without tubercles and with 3 short setae along posterior margin on either side. Terga III and IV each with 4 anteriorly directed bifid hooked spines near posterior margin on either side. Terga V, VI and VII each with a simple row of short, posteriorly directed setae near anterior margin on either side. Tergum IX with comb-like groups of minute spines near anterior margin on either side; caudal spines short, narrowly separated with their bases swollen, tips blunt and directed posteriorly. Sternum IV with 2 short setae along posterior margin on either side. Sterna V, VI and VII each with a pair of bifid hooks on either side. Sternum VIII with a row of minute setae.
on either side. Cocoon (Fig. 18) yellowish brown, slipper-shaped, loosely woven with a thick, deeply dentated anterior margin; maximum length 4.20 mm, maximum width 1.5 mm and height 1.6 mm.

**Larva.** Mature specimens 6.4-6.8 mm long. Whole body greyish brown. Head capsule brownish yellow, darkened posteriorly; cephalic apotome with positive head spots; spots c, d and e, f very close together and coalescent each other. Lateral surface of head capsule also with positive spots (Fig. 21); spots l and m indistinct, surrounded by broad darkened area; eye spots rather small, surrounded by narrow, transparent clear area; a row of 3 isolated spots lying each other at a different distance under eye. Eyebrow usually distinct, with a indistinct single spot. Antenna (Fig. 24) stout, longer than stalk of cephalic fan; proportional length of each segment I-IV about 12:14:10:1; segments I and II pale grey, segment III pale brown; segment II without secondary annulation. Cephalic fan with 26-28 main rays. The form of cephalic apotome variable as shown in Fig. 22; cephalic apotome with negative head spots. Hypostomium heavily sclerotized anteriorly, hypostomial teeth as shown in Fig. 20; median tooth and outer lateral teeth prominent. Postgenal cleft (Fig. 19) rounded and narrow; its depth approximately 1.5 times as long as postgenal bridge. Elongate pale spot recognized on either side of postgenal cleft. Inner subapical ridge of mandible with 3 lightly pigmented comb-teeth, the first and third teeth longer than second one; subapical inner margin with 10 transparent and slender fine serrations, the anterior 4 teeth prominent; posterior margin with 1 large marginal tooth and 2 small teeth; apical tooth and 2 outer teeth of mandible strongly sclerotized. Lateral plate of proteg narrow and slightly sclerotized, extending 1/3 length of apical segment. Each abdominal segment with reddish violet band. Abdominal cuticle bare, except last segment with colourless hairs dorsally. Rectal gill lobes simple. Anal sclerite usually X-shaped and with subequal arms. Posterior cirque with about 86 rows of each 10-12 hooks. Ventral papillae prominent, subconical and situated laterally.

**Type series.** *Holotype:* Female, preserved in alcohol solution, with associated pupal skin and cocoon. The pupa was collected from the stream of Ohosawa River situated in the northern part of Rebun Island, Hokkaido, July 25, 1977 (H. Ono leg.).

*Allotype:* Male, the same locality and data as the holotype.

*Paratypes:* Three pairs of adults, 5 pupae and 20 larvae preserved in alcohol solution. The locality and date are the same as the holotype.

Holotype and allotype will be deposited in the National Science Museum in Tokyo. Paratypes are preserved in the Laboratory of Entomology, Obihiro University in Hok-
<table>
<thead>
<tr>
<th>Stages</th>
<th>C. rebunense n. sp.</th>
<th>C. konoi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>narrower than that of C. konoi, a:b:c=1.5 : 1 : 2.5.</td>
<td>broader than that of C. rebunense, a:b:c=2 : 1 : 2.5-2.6.</td>
</tr>
<tr>
<td>Scutum</td>
<td>covered with short, golden yellow hairs.</td>
<td>covered with long, greyish yellow hairs.</td>
</tr>
<tr>
<td>Female</td>
<td>greyish yellow, covered with short greyish silver hairs and more swollen than that of konoi.</td>
<td>brownish yellow, covered with long pale brown hairs and more slender than that of rebunense.</td>
</tr>
<tr>
<td>Abdomen</td>
<td>dull black covered with greyish silver hairs.</td>
<td>black covered with pale yellow hairs.</td>
</tr>
<tr>
<td>Paraproct</td>
<td>semicircular in lateral view.</td>
<td>subquadrat in lateral view.</td>
</tr>
<tr>
<td>Inner margin of gono-</td>
<td>concave.</td>
<td>straight.</td>
</tr>
<tr>
<td>pophyses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genital fork</td>
<td>with long, thick stem and lightly expanded arms; inner margin of arms heavily scleritized.</td>
<td>with short, slender stem and widely expanded arms; inner margin of arms without scleritized.</td>
</tr>
<tr>
<td>Clypeus</td>
<td>half shiny, blackish brown, with sparse long dark hairs.</td>
<td>black, with sparse greyish silver pubescence.</td>
</tr>
<tr>
<td>All femora, tibiae and</td>
<td>more swollen than that of konoi.</td>
<td>more slender than that of re bunense.</td>
</tr>
<tr>
<td>hind basitarsi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdomen</td>
<td>velvety black.</td>
<td>dull black.</td>
</tr>
<tr>
<td>Male</td>
<td>conic quadrate.</td>
<td>rectangular.</td>
</tr>
<tr>
<td>Coxite</td>
<td>short; its apex with 1 long, stout apical spine.</td>
<td>long; its truncate apex with 1 short, apical spine.</td>
</tr>
<tr>
<td>Style</td>
<td>discus-shaped; median part with a broad carina; anterior margin slightly concave; basal arm short and clearly bent outwardly.</td>
<td>lamellate, transverse; median part without broad carina; ante-</td>
</tr>
<tr>
<td>Ventral plate</td>
<td></td>
<td>rior margin double convex; basal arm long and clearly bent inwardly.</td>
</tr>
<tr>
<td>Parameral hook</td>
<td>short.</td>
<td>long.</td>
</tr>
<tr>
<td>Pupae</td>
<td>slender; length of trunks variable but longer than those of konoi; filaments greyish brown.</td>
<td>broad; trunks shorter than those of rebunense; filaments brownish yellow.</td>
</tr>
<tr>
<td>Terga VI, VII and VIII</td>
<td>each with a simple row of short setae.</td>
<td>each with double rows of short setae.</td>
</tr>
<tr>
<td>Tip of caudal spine</td>
<td>blunt and directed posteriorly.</td>
<td>slender and directed anteriorly.</td>
</tr>
<tr>
<td>Larvae</td>
<td>greyish brown.</td>
<td>reddish orange.</td>
</tr>
<tr>
<td>Whole body colour</td>
<td>brownish yellow; spots c and d coalescent each other.</td>
<td>yellow; spots c and d separated each other.</td>
</tr>
<tr>
<td>Head capsule</td>
<td>with 26-28 main rays.</td>
<td>with 34-36 main rays.</td>
</tr>
<tr>
<td>Cephalic fan</td>
<td>rounded; its depth 1.5 times as long as postgenal bridge.</td>
<td>spade-shaped and a little longer than postgenal bridge.</td>
</tr>
<tr>
<td>Postgenal cleft</td>
<td>with 1 large marginal tooth and two small teeth.</td>
<td>with 1 large marginal tooth only.</td>
</tr>
<tr>
<td>Inner subapical</td>
<td>with subequal arms.</td>
<td></td>
</tr>
<tr>
<td>posterior margin of mandible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anal sclerite</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Materials examined: Eight pairs of adults (reared), 10 pupae and 40 larvae (collected); July 25, 1977, slow streams of Ohosawa River in the Rebun Island, Hokkaido. Eleven larvae and 3 pupae; July 25, 1977, small stream of the Sucoton cape in the Rebun Island, Hokkaido. All materials were collected by H. Ono.

Remarks. The present species is a member of *ruficorne*-group defined by Crosskey (1969) and is assigned to the member of the genus *Cnetha* Enderlein (1930) among the tribe *Eusimulini* defined by Rubtsov (1974b) because having short, boot-shaped style, discus-shaped ventral plate, slender endparameral organ with one short hook, Y-shaped median sclerite, pupal gill with 4 filaments, larval antenna without secondary annulations, larval mandible without supernumerary serrations and postgenal cleft medium-sized and rounded. *Cnetha rebuswense* n. sp. closely related to *C. konoi* (Takahasi, 1950), but it differs from the later in many characters shown in the table 1.

Furthermore, this new species somewhat resemble to *Cnetha subgriseum* (Rubtsov, 1940) in Central Asia, and slightly resemble to *Gomphostilbia yamayaense* (Ogata et Sasa, 1954) in Japan. However, the present species is clearly distinguishable from the latter two species by the structures of genitalia in both sexes, pupal respiratory organ and cocoon.

Biological notes. The life history and biting habits of this species are unknown. During July, the full grown larvae were found in the streams of Ohosawa River, and they pupated in late July. Mature larvae and pupae attach on submerged read stalks. They occur slow stream in lowland which is a constantly wind-swept situation.

Distribution. Japan (Rebun Island).

*Cnetha konoi* (Takahasi, 1950)
(Figs. 27–52)

[Japanese name: Kōno-hososune-buyu]


Female. Length: body, 2.50-2.75 mm; wing, 2.20-2.50 mm. General body colour dull brownish black to black; legs brownish yellow.

Head dull black, slightly narrower than thorax, posterior and undersurface covered with greyish silver hairs. Frons dull black, narrow, longer than width with fine, short greyish silver hairs; *a*: *b*: *c* = 2:1:2.5-2.6 (*a*: greatest width of frons, *b*: narrowest width of frons and *c*: height of frons, cf. Fig. 35). Clypeus paler than frons, longer than width with dense silver-grey pubescence. Antenna (Fig. 28) composed 2+9 segments; scape and pedicel yellowish brown with fringe of black hairs on each distal margin; flagellum blackish brown with dense whitish silver pubescence; first and last segments longer than the other segments. Maxillary palp (Fig. 30) blackish brown, covered with brown hairs, proportional length of each segment from base to apex 10:10:21:20:42; segment III relatively enlarged, about twice as wide as the following one; sensory vesicle (Fig. 31) globular and elongate, about twice as long as width and about 1/2 as long as respective segment, proximally situated. Maxilla (Fig. 32) with 24 (11 inner teeth and 13 outer ones) retorse teeth. Mandible with 68-75 (28-29 outer teeth and 40-46 week inner ones) fine serration. Median distal space of cibarium (Fig. 34) broad and shallow; distal margin without denticulus; dorsolateral arm broad, outwardly curved and directed posteriorly, a sclerotized ridge on inner margin.

Thorax black. Prescutum and scutum covered with long, fine recumbent greyish yellow hairs. Scutellum dull black with greyish yellow, recumbent somewhat longer hairs than that of scutum and with a row of stout, erect and long brown hairs along posterior and lateral margin of scutellum. Postscutellum brownish black and bare. Pleural membrane dull brown, katepisternum black and bare; pleural tuft pale yellow. Wing hyaline; veins dark brown. Costa with 2 parallel rows of short spinules as well as hairs. Ventral surface of subcosta with 2 rows of hairs. Radius with basal section fully haired. *R*₁ with a single row of
12-14 short spinules intermixed with hairs. Basal cell absent. Fringe of calyptr and alar lobe pale brown. Halter pale yellow with fringe of short pale yellow hairs. All coxae and trochanters dark brown with short pale yellow hairs. All femora brownish yellow, covered with long pale brown hairs; fore femur darker towards distal end and with distal 1/5 black; mid femur with distal 1/6 black; hind femur dilated with 1/3 black, about 5 times as long as its greatest width. All tibiae brownish yellow, covered with long pale brown hairs; fore and mid tibiae with about distal 1/5 black; hind tibia with distal 1/3 black and swollen, about 7.5 times as long as its greatest width. Fore and mid tarsi black, covered with short black hairs; fore basitarsus cylindrical, not dilated and about 7 times as long as its greatest width. Hind basitarsus dull brown, covered with pale brown hairs, darker towards distal end, flat and nearly parallel-sided and about 1.5 times as long as the remaining tarsal segments together; remaining segments black, covered with black hairs. Calcipala well developed with long black bristles and its apex reaching to pedisculus; pedisculus marked and placed at basal 1/3 of 2nd segment. Each claw gently curved, with a large basal tooth (Fig. 38).

Abdomen black, sparsely covered with short, semi-erect pale yellow hairs; terga VII and VIII with long, erect black hairs. Basal scale pale yellow; basal fringe pale yellow, longer laterally. Genitalia as shown in Fig. 40 (a, b). Paraproct narrow dorsally, broadly rounded on the anteroventral margin, subquadrate in lateral view and mitre-shaped in ventral view; moderately setose. Cercus long oval-shaped in ventral view, rounded apically, inner margin strightly concave; dual subquadrate in lateral view, with a sulcus on the central area; anterior part strongly setose and posterior part poorly setose. Anterior gonapophyses simple, with 6-8 macrosetae as well as numerous microsetae; inner margin heavily sclerotized and nearly straight; posterior margin slightly convex and somewhat transparent. Genital fork usually Y-shaped, with short slender and strongly sclerotized stem and widely expanded arms; distal expansion of arm nearly triangular with strongly sclerotized blunt projection on its proximal surface. Spermatheca ellipsoidal approximately 1.3 times as long as its greatest width; its surface strongly sclerotized and without reticulate pattern and internal hairs.

**Male.** Length: body, 2.35-2.50 mm; wing, 2.15-2.35 mm. General body colour darker than that of female, black; legs dark brown.

Head black, wider than thorax; posterior and undersurface of head, frons and clypeus with long black hairs. Clypeus black, covered with sparse greyish silver pubescence. Holoptic upper faceties reddish orange, lower ones dull brown in living examples; upper faceties with about 18 transverse rows. Antenna (Fig. 27) entirely blackish brown; first flagellomere elongate, about 2.1 times as long as the following one. Maxillary palp (Fig. 29) blackish brown with 5 segments in proportion of 3:3:8:8:19; sensory vesicle globular and very small.

Thorax black. Prescutum and scutum velvety black and covered with long, fine recumbent pale golden yellow hairs. Scutellum black with long pale yellow hairs and concolored pubescence. Postscutellum, pleural membrane and katepisternum black and bare. Wing as in the female except subcosta with a few hairs on basal 1/3. Halter brown; stem dull brown, fringed with short and pale hairs. All coxae and trochanters dark brown with short yellow hairs. All femora dark brown covered with long yellow hairs; hind femur dilated, about 4.2 times as long as its greatest width. All tibiae dark brown covered with long yellow hairs; hind tibia swollen, about 6 times as long as its greatest width. All tarsi black; fore and mid basitarsi cylindrical; fore basitarsus about 6 times as long as width; hind basitarsus flat, nearly parallel sided, more slender than tibia.

Abdomen dull black, with sparsely minute and pale yellow hairs. Basal scale brown; basal fringe black, longer laterally. Genitalia as shown in Fig. 41 (a, b, c, d, e). Coxite large and rectangular, about twice as long as wide; dorsal opening occupying more than 2/3 of dorsal surface of style; considerably setose. Style large, boot-shaped and twisted inward, as long as style; its truncate apex with 1 stout apical spine; fairly setose.
Ventral plate lamellate, transverse, broadly rounded posteriorly, and having hairy notch on posterior margin; basal arm long, strongly sclerotized and clearly bent inwardly; anterior margin of ventral plate slightly darkened. Median sclerite Y-shaped, slender and strongly sclerotized with bifid tip. Endoparameral organ wide, with a long parameral hook.

**Pupa.** Length 2.35–2.55 mm (excluding respiratory filaments). Respiratory organ 2.15–2.30 mm, consisting of 4 filaments on each side arranged in the following manner; base short, tinged with pale brownish yellow, covered with many spicules and connected to stem; stem brownish yellow, branched into 2 trunks of variable length, usually extending in a vertical plane at the angle of 45 degrees or less; each trunk divided again into 2 filaments as shown in Fig. 42 (a, b); all filaments brownish yellow, tapered towards tip, extending anteriorly close together with numerous transverse and shallow furrows. The integument of head and thorax brown with numerous, ring-like granules dorsally and laterally. Head trichomes 3 pairs, all long and simple. Thoracic trichomes 3 simple pairs and 1 double pair dorsally and 3 simple pairs laterally; all long. Female antenna reaching to hind margin of head; male one extending about 2/3 distance to hind margin of head. Abdominal segments consisting extremely thin and transparent skins, except terga I, II and IX. Tergum I and II pale greyish brown with sparse tubercles. Tergum I with 2
long setae on either side. Tergum II with 4 stout, anteriorly directed long setae and 2 short setae along posterior margin on either side. Terga III and IV each with 4 anteriorly directed hooked spines near posterior margin on either side. Tergum V with a simple row of short, posteriorly directed setae near anterior margin. Terga VI, VII and VIII each with transverse double rows of short, fine posteriorly directed setae near anterior margin. Tergum IX brownish tuberculate with comb-like groups of minute spines near anterior margin on either side; caudal spines short, narrowly separated with their bases swollen, tips slender and directed anteriorly. Sternum IV without any seta and hook. Sternum V with a inner trident hook and a outer bifid hook on either side. Sterna VI and VII each with a pair of bifid hooks on either side. Sternum VIII with comb-like group of minute setae on either side. Cocoon

(Fig. 41) Cnetha konoi (male genitalia)

a, genitalia, ventral view; b, ventral plate, lateral view; c, ventral plate, end view and median sclerite; d, style, two view; e, dorsal plate and paramere

(Fig. 42-44) Cnetha konoi (pupae)

42a, respiratory organ, long trunk type; 42b, respiratory organ, short trunk type; 43, pupal skin, left, dorsal and right half, ventral view (distal parts of filaments excepted); 44, cocoon, dorsal and lateral view.

(Fig. 44) yellowish brown, slipper-shaped, tightly woven with a thick anterior margin; maximum length 4.00 mm, maximum width and height 1.5 mm respectively.

Larva. Mature specimens 6.2-6.8 mm long. Whole body reddish orange. Head capsule yellow, darkened posteriorly; cephalic apotome with positive head spots; all spots very marked; spots e and f very close together and coalescent. Lateral surface of head capsule also with positive spots (Fig. 47); spots l and m distinct; eye spots rather large, surrounded by narrow and pale yellow clear area; a row of 3 isolated spots lying each other at different distance under eye. Eyebrow usually distinct, without a single spot. Antenna (Fig. 50) longer than stalk of cephalic fan; proportional length of each segment I-IV about 15:16:10:1; segment I brown, segments II and III transparent; segment II without secondary annulation. Cephalic fan with 34-36 main rays. The form of cephalic apotome immediately after
Figs. 45-52 Cnetha konoi (larvae)
45, head capsule, ventral view; 46, hypostomium; 47, head capsule, dorsal and lateral view; 48, form of cephalic fans immediately after the moult; 49, tip of mandible; 50, antenna; 51, rectal segments of abdomen, lateral view and rectal gill; 52, rectal segments of abdomen, dorsal view.

The moulted as shown in Fig. 48; head capsule white, cephalic fans brown. Hypostomium heavily sclerotized anteriorly, hypostomial teeth as shown in Fig. 46; median tooth and outer lateral teeth prominent. Postgenal cleft (Fig. 45) narrow, spade-shaped and a little longer than postgenal bridge. Elongate spot recognized on either side of postgenal cleft. Inner subapical ridge of mandible with 3 lightly pigmented comb-teeth, the first tooth longest; subapical inner margin with 8 transparent and slender fine serrations, the apical one most prominent; posterior margin with 1 large marginal tooth; apical tooth of mandible strongly sclerotized, ventral outer tooth clearly longer than dorsal one. Lateral plate of proleg narrow, slightly sclerotized, extending 1/3 length of apical segment. Each abdominal segment with dark greyish band. Abdominal cuticle bare, except last segment with colourless hairs dorsally. Rectal gill lobes simple. Anal sclerite usually X-shaped with anterior short arms about 2/3 times as long as posterior ones. Posterior cirrlet with about 60 rows of each 12-14 hooks. Ventral papillae prominent, conical in shape and situated laterally in spaced distance.


**Remarks.** This species was originally described based upon the male and cocoon from Hokkaido under the name Neveurnania konoi Takahasi, 1950. However, no complete description of all stages have been given yet. Although this species is very unique in morphological characters, it is considerably allied to C. rebunense n. sp. However, this species is easily distinguishable from C. rebunense by the preceding table. As stated before,
C. konoi appears to be assigned to the *vernun*-group of the subgenus *Eusimulium* defined by Crosskey and Davies (1972). It is easily separated from the other known species of *vernun*-group of this genus by the features of genitalia in both sexes and cocoon.

**Biological notes.** The pupae on submerged vegetation were collected during the period from May to September, and the occurrence showing two peaks, the first peak was in May and the second in August. No larvae were found from October to February. The first adults appeared in late May. Therefore, this species seems to be bivoltine and probably overwinters in the egg stage. Mature larvae and pupae attach to trailing grasses, especially on the underside of dwarf reed leaves and stalks. They were found considerably rapid stream, often together with the larvae of *Simulium japonicum* and *Helodoni multicaudis*. Biting habits are unknown.

**Distribution.** Japan (Hokkaido).

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**References**


