OLE A. SÆTHER[1] & FABIO DE OLIVEIRA ROQUE[2]

[1]*Museum of Zoology, University of Bergen, Norway*
[2]*Laboratorio de Entomologia Aquática, Departamento de Hidrobiologia, Universidade Federal de São Carlos, Brazil*

# NEW NEOTROPICAL SPECIES OF *NANDEVA* (DIPTERA: CHIRONOMIDAE), WITH A PHYLOGENY OF THE TANYTARSINI

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The diagnosis of the genus *Nandeva* Wiedenbrug, Reiss & Fittkau is emended. Two new species, *N. latiloba* and *N. strixinorum*, are described as male imagines, the tentatively associated male imago of *N. tropica* Wiedenbrug, Reiss & Fittkau is described, *N. gaucha* Wiedenbrug, Reiss & Fittkau is re-examined, and a key to male imagines is presented. The genus is shown to belong to the tribe Tanytarsini but differing from other members of the tribe by the combination of presence of median antepronotal setae with costa ending proximal to distal end of $M_{3+4}$, 0-4 setae on squama, and median volsella absent. The female imagines have a well divided gonapophysis VIII, short notum and nearly straight spermathecal ducts. The pupa differ from other Chironominae by the lack of thoracic horn, frontal setae, anal lobe fringe, anal spur or comb and pedes spurii A and B, and by having paired or fused anterior patches on tergites II-VII or III-V and posterior hook rows on tergites II-V or VI. The cladograms from parsimony analyses of the Tanytarsini and basal Chironomini with *Pseudochironomus* Malloch as outgroup mostly show *Nandeva* as either closely related to *Pontomyia* and *Lithotanytarsus* or placed basally in the Tanytarsini. The tribe Tanytarsini and the subtribe Zavreliina in various analyses always are monophyletic, but the latter sometimes includes *Neozavrelia* and *Seppia*, sometimes not. A *Micropsectra* group and often a *Tanytarsus* group are recognisable, but they may include differing number of genera. The tribe Chironomini becomes monophyletic only when some characters are weighted.
Correspondence: O. A. Sæther, Museum of Zoology, University of Bergen, N-5007 Bergen, Norway. E-mail: ole.sather@zmb.uib.no
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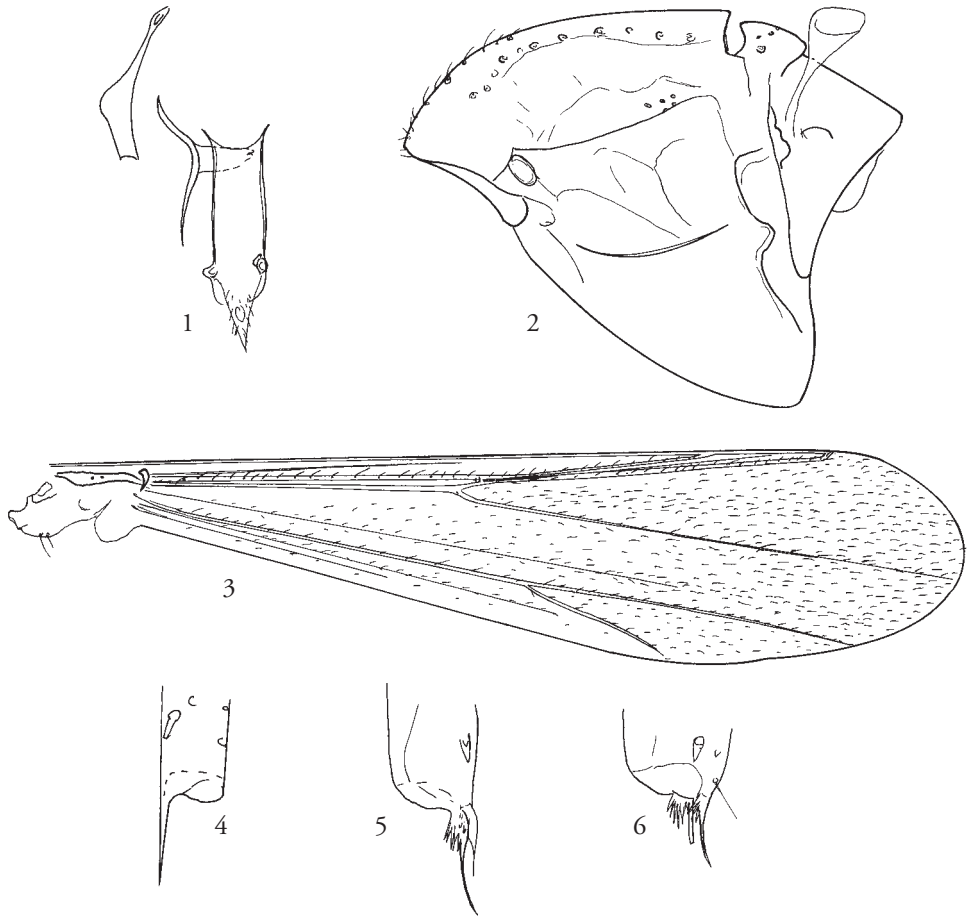
When examining some adult chironomids from a stream in São Carlos, Brazil, we found a species apparently belonging to a new genus of Tanytarsini, but possessing two setae on the squama and lacking a median volsella, unlike other Tanytarsini. The species closely resembled the recently described *Nandeva* Wiedenbrug, Reiss & Fittkau (1998) except for possessing a wider extension of the superior volsella, but the angle of wing vein RM which was aligned as a continuation of $R_{4+5}$ showed that the species belonged in the Tanytarsini. When an additional species, even more similar to *Nandeva*, was found we decided to examine if the illustration of the wing of *Nandeva* (Wiedenbrug et al. 1998: fig. 1B) could be in error. Dr. Wiedenbrug kindly re-examined and confirmed that the illustration was incorrect and that the wing venation was of Tanytarsini type with RM continuous with $R_{4+5}$ and also with $R_{4+5}$ ending proximal to apex of $M_{3+4}$. She also arranged for the loan of male imagines present in the Zoologische Staatssammlung in Munich. That material included four not very good specimens, which almost certainly belonged to the species *Nandeva tropica* Wiedenbrug, Reiss & Fittkau described as pupal exuviae. We here describe the two new species from São Carlos together with the tentatively associated males of *N. tropica*.

The tribe Tanytarsini can be divided into two fairly distinct groups, the subtribes Zavreliina and Tany-




Figs. 1-6. *Nandeva latiloba* sp.n., male imago. – 1, Tentorium, stipes and cibarial pump; 2, Thorax; 3, Wing; 4, Apex of front tibia; 5, Apex of middle tibia; 6, Apex of hind tibia.

tarsina (Sæther 1977). The larvae of the subtribe Zavreliina all construct transportable cases of sand grain, or small wood or plant remains. Most genera occur in small streams, springs and lakes, but *Stempellina* Thienemann & Bause, 1913 is eurytopic (Cranston et al. 1989). Recently the genera *Friederia* Sæther & Andersen, 1998 and *Seppia* Ekrem & Sæther, 2000, showing reduction in several features, were described from the western rainforest of Ghana (Sæther & Andersen 1998, Ekrem & Sæther 2000). Both genera were placed in Zavreliina primarily because of the lacking digitus. However, of these genera no females or immatures were known. Cranston (1999) described the female of *Nandeva*. The gonapophysis VIII is divided exactly as in *Micropsectra* Kieffer, 1909 and related genera, while all genera of the Zavreliina of which female genitalia are known as well as *Tanytarsus* Van der Wulp, 1874 and related genera have an undivided gonapophysis VIII. The placement of *Nandeva* as well as of *Friederia* and *Seppia* are highly uncertain. Wrongful inclusion of these genera in the Tanytarsini may render the tribe non-monophyletic. A parsimony analysis of all genera of Tanytarsini including basal Chironomini genera thus was performed.

## Material, methods and morphology

Morphological nomenclature follows Sæther (1980). All measurements are given as ranges. The holotypes of the new species are deposited at Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZSP). Other specimens are returned to Zoologische

Staatssammlung, Munich (ZSM) or deposited at Laboratorio de Entomologia Aquatica, São Carlos, Brazil (SC) or at the Museum of Zoology, Bergen, Norway (ZMBN).

For the cladistic analysis data were analysed under parsimony with PAUP 4.0b.10 (Swofford 1998) and with the help of MacClade 3.08a (Maddison & Maddison 1999) on a Power MacIntosh 8200/120.

### *Nandeva* Wiedenbrug, Reiss & Fittkau

Type species: *Nandeva gaucha* Wiedenbrug, Reiss & Fittkau, 1998: 60, by original designation.

Diagnostic characters. – The male imagines are separable from other Tanytarsini by having bare eyes with no dorsomedian elongation, the median antepronotal setae, costa ending proximal to distal end of $M_{3+4}$, subcosta and M without setae, 0-4 setae on squama, tibial combs all with spurs, anal point long and parallel-sided or spatulate, median volsella absent. The female imagines have gonapophysis VIII well divided, short notum and spermathecal ducts nearly straight. The pupa differ from other Chironominae by lacking thoracic horn, frontal setae, anal lobe fringe, anal spur or comb and pedes spurii A and B, and by having paired or fused anterior spinepatches on tergites II-VII or III-V and posterior hook rows on tergites II-V or VI.

Diagnosis. – A full diagnosis was given by Wiedenbrug et al. (1998) and Cranston (1999) except for tanytarsine wing venation and anteriorly tapered tergite VIII. In addition the separate tibial combs, the absence of pulvilli, the absence of a digitus of the superior volsella, and the absence of crests, setae or spines on the male anal point should be noted.

Distribution. – The genus is known from Brazil, Chile, Panama and Australia.

**Key to male imagines of *Nandeva***

1. Anal point spatulate; digitiform extension of superior volsella with about 3 basal setae on inner margin, squama bare; Australian (Cranston 1999, figs. 26-29) ..... *N. fittkaui* Cranston
– Anal point parallel-sided or very slightly tapering; inner margin of digitiform extension with 0-1 basal and 0-1 median setae; squama probably always setose; Neotropical ..... 2
2. Digitiform extension of superior volsella 6-8 µm wide with 4 apical to median setae on inner margin; M vein at most with one seta; 9-13 dorsocentrals; legs and abdomen banded (figs. 1-6, 9) ..... *N. latiloba* sp.n.
– Digitiform extension of superior volsella narrow, at most 6 µm wide, inner margin with 2-3 apical and 0-1 median setae; M vein with 8-19 setae; 12-25 dorsocentrals; legs and abdomen unicolorous or banded ..... 3
3. Antepronotum with continuous row of 5-9 dorsal to median setae and 3-8 lateral setae; abdomen not banded, all dark; extension of superior volsella with three apical setae and one basal seta on inner margin (fig. 7) ..... *N. gaucha* Wiedenbrug, Reiss & Fittkau
– Antepronotum with 1-4 dorsal to median setae and 2-3 lateral setae; extension of superior volsella with 2-3 apical and 0-1 median seta on inner margin ..... 4
4. Antennal ratio 0.49-0.74, ultimate flagellomere 184-263 µm long; abdomen nearly uniformly brown or with dark bands in more than anterior half of tergites II-V; hypopygium as in fig. 8 ..... *N. strixinorum* sp.n.
– Antennal ratio about 0.30-0.35, ultimate flagellomere 101-113 µm long; abdomen banded with narrow bands of tergites II-V in anterior third to half; hypopygium as in fig. 10 ..... *N. tropica* Wiedenbrug, Reiss & Fittkau

### *Nandeva gaucha* Wiedenbrug, Reiss & Fittkau (fig. 7)

*N. gaucha* Wiedenbrug, Reiss & Fittkau, 1998: 60.

Material examined. – BRAZIL: Paratype ♂, Rio Grande do Sul, São Fransisco de Paila, Arroia dos Carros, 23. xi. 1994, S. Wiedenbrug (ZSM).

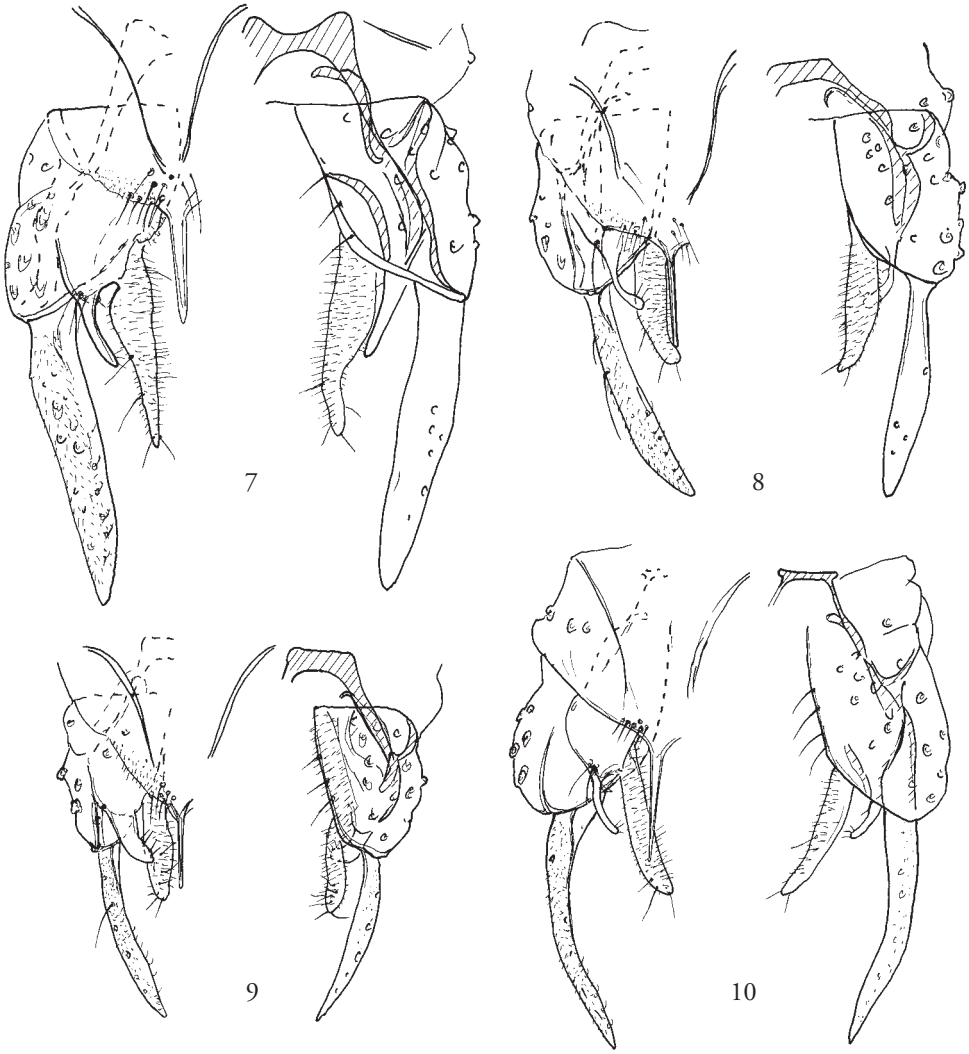
Diagnostic characters. – The antepronotum with a continuous row of dorsal to median setae and several lateral setae combined with a bare inner margin of the superior volsella extension, unbanded abdomen and an antennal ratio of 0.19-0.30 separate *N. gaucha* from other members of the genus.

### *Nandeva latiloba* sp.n. (figs. 1-6, 9)

Type material. – Holotype, ♂, BRAZIL: São Paulo State, São Carlos, Fazzari UFSCar, 21°58'07.6"S 47°53'08.8"W, 24.i.2000, F. O. Roque (MZSP). – Paratypes: 4♂, as holotype except iv.2002 (SC, ZMBN).

Diagnostic characters. – The relatively broad extension of the superior volsella with 4 setae on inner margin will separate *N. latiloba* from other members of the genus. The species also has at most 1 seta on M and an AR of 0.37-0.50.

Etymology. – From Latin, *latus*, broad, wide, and *lobus*, lobe, projection, referring to the wider extension of the superior volsella.




Figs. 7-10. *Nandeva* spp., male imagines, hypopygium, dorsal view left, apodemes and ventral view right. – 7, *N. gaucha*;. 8, *N. latiloba* sp.n.; 9, *N. strixinorum* sp.n.; 10, *N. tropica*.

Male imago (n = 4-5 except when otherwise stated)

Total length 1.20-1.51, 1.35 mm. Wing length 0.70-0.86, 0.76 mm. Total length/wing length 1.68-1.87, 1.78. Wing length/length of profemur 2.30-2.36, 2.32. Abdomen brownish with pale posterior margins; thorax with pale ground colour and brown vittae, anepisternum, preepisternum and postnotum and light brown scutellum; femora and tibiae pale.

Head. AR 0.37-0.50, 0.43. Ultimate flagellomere 113-161, 127 µm long. Temporal setae 9-13, 10; including 4-6, 5 inner verticals plus frontals, 3-4, 3 outer verticals, and 2-3, 2 postorbitals. Clypeus with 6-8, 8 setae. Tentorium (fig. 1) 71-90, 79 µm long; 11-19, 14 µm wide. Stipes 64-79, 71 µm long; 15 µm (1) wide. Cibarial pump and stipes as in fig. 1. Lengths of palpomeres (in µm): 11-23, 16; 23-26, 25; 79-105, 89; 85-113, 95; 94-122 (3). Third palpomere with 2-4 distinctly scalpellate sensilla clavata.

Thorax (fig. 2). Antepronotum with 3-4, 3 median and 3 lateral setae. Dorsocentrals 9-13, 11; acrostichals 10-13, 12; prealars 3-5, 4. Scutellum with 8-10, 9 setae.

Wing (fig. 3). VR 1.26-1.36, 1.29. Brachiolum with 2 setae; Sc and An bare; R with 13-22, 17 setae; $R_1$ with 6-14, 10; $R_{4+5}$ with 18-30, 23; M with 0-1, 0; $M_{1+2}$ with 20-39, 29; $M_{3+4}$ with 13-32, 20; Cu with 14-16, 15; $Cu_1$ with 8-9, 9; and postcubitus with 13-30, 19 setae. Cell $m_{1+2}$ with 40-53, 48 setae; m basally of RM with 10-33, 21 setae.

Legs. Scale on front tibia (fig. 4) with 23-26, 24 µm long apical point. Spurs of middle tibia (fig. 5) 26-38, 32 µm and 19-26, 23 µm long including combs; of hind tibia (fig. 6) 30-36, 31 µm and 19-23 (2) µm long including combs. Width at apex of front tibiae 21-25, 22 µm; of middle tibiae 23-30, 25 µm; of hind tibiae 23-30, 25 µm. Lengths (in µm) of front to hind femora as: 302-369, 325; 321-406, 347; 321-416, 356; of front to hind tibiae 250-312, 271; 241-312, 267; 312-425, 359. Tarsi lost.

Hypopygium (fig. 9). Tergal band of sinuous V-type, widely separated. Tergite IX with 16-20, 18 setae at base of anal point; laterosternite with 3-4, 3 setae. Anal point 33-53, 58 µm long; 3 µm wide at base. Phallapodeme 50-56, 53 µm long; transverse sternapodeme 15-31, 25 µm long; 6-9, 8 µm wide, without oral projections. Gonocoxite 56-83, 68 µm long; gonostylus 62-75, 68 µm long. Superior volsella with 21-26, 23 µm base, with 1 apicolateral seta; and 21-26, 22 µm long, 6-8, 7 µm wide extension with 4 setae apically on inner margin and 5 minute apicodorsal setae, without microtrichia; inferior volsella 38-49, 42 µm long with 7 apical setae and long microtrichia. HR 0.88-1.05, 0.96; HV 1.94-2.02 (3).

Ecology. – *Nandeva latiloba* was collected with a pyramidal floating trap on wetland of a first order stream (21°59' S 47°54' W), located in a cerrado area in the São Carlos District, São Paulo (Southeast Brazil). The wetland zone is florested and show widely fluctuating hydrology. Physical and chemical characters indicated great amount of CPOM (leaves, fruits and gravel), low oxygen level (OD 1.19-1.17 $mg.l^{-1}$), low profundity (< 15 cm), acid water (pH 4.21-4.35) and low velocity of the surface water (< 0.5 $cm.s^{-1}$).

***Nandeva strixinorum*** sp. n.
(fig. 8)

Type material. Holotype, ♂, BRAZIL: São Paulo State, São Carlos, Fazzari UFSCar, 21°58'07.6" S 47°53'08.8" W, 1999, F. O. Roque (MZSP). – Paratypes: 3 ♂, as holotype (SC, ZMBN); São Paulo State, Corrego do Silêncio, Parque Estadual do Jaragua, 23°24' S 45°44' W, 2♂, 14.xii.2000, F. O. Roque (SC); São Paulo State, Picinguaba, Vespa stream, 23°20'15.7" S 44°50'14.6" W, 1♂, ix.2001, F. O. Roque (SC); São Paulo State, Cananeia, Chefão stream, 24°53'02.0" S 47°51'22.3" W, 2♂, 16.ii.2002, F. O. Roque (SC, ZMBN); São Paulo State, Cananeia, Gruta stream, 24°53'03.S 47°51'22.8", 2♂, 16.ii.2002, F. O. Roque (SC, ZMBN).

Diagnostic characters. – The relatively high antennal ratio (0.49-0.74) combined with an unbanded to broadly banded abdomen will separate the species from other members of the genus.

Etymology. – Named in honour of Drs. Susana Trivinho Strixino and Giovanni Strixino, São Carlos, Brazil.

**Male imago** (n = 9-11 except when otherwise stated)

Total length 1.46-2.32, 1.96 mm. Wing length 0.79-1.18, 1.02 mm. Total length/wing length 1.76-2.08,1.93. Wing length/length of profemur 1.95-2.51, 2.31. Abdomen nearly fully brown with posterior margins of tergites VI-VIII pale or tergites II-V with posterior thirds pale; thorax with pale ground colour and dark brown vittae, anepisternum, preepisternum and postnotum, and light brown scutellum; femora and tibiae brown. Legs more or less distinctly banded with apical third of femora darkened, all tibiae dark in apical ¼ with indication also of basal band. Metatarsi dark in apical ½-⅔, $ta_2$ and $ta_3$ dark in apical 2⁄3 to 4⁄5, $ta_4$ and $ta_5$ all dark.

Head. AR 0.49-0.74, 0.65. Ultimate flagellomere 158-263, 220 µm long; with 3-4, 3 apical setae, shortest 56-81, 63 µm (6) long; longest 75-99, 88 µm (8) long. Temporals 12-18, 14; consisting of 6-13, 10 inner verticals; 1-4, 2 outer verticals; and 2-3, 3 postorbitals. Clypeus with 10-19, 14 (7) setae. Lengths of palpomeres (in µm): 15-26, 20; 26-38, 30; 90-174, 130; 94-180, 125; 120-240, 169 (6). Third palpomere with 3-5 distinctly lanceolate 14-15 µm long sensilla clavata in pit.

Thorax. Antepronotum with 3-5, 4 dorsal, 1 median and 3-4,3 lateral setae. Dorsocentrals 15-24, 21; acrostichals 12-21, 17; prealars 3-7, 5. Scutellum with 8-12, 9 setae.

Wing. VR 1.23-1.47, 1.36. Brachiolum with 2 setae; Sc with 0-16, 5 setae, M with 12-19, 15 (8) setae; R with 18-40, 27 (8) setae; $R_1$ with 12-34, 22 (8); $R_{4+5}$ with 33-48, 40 (8); $M_{1+2}$ with 35-52, 43 (7); $M_{3+4}$ with 25-39, 30 (8); Cu with 21-34, 29 (8); $Cu_1$ with 9-16, 12 (7); postcubitus with 29-54, 37 (6) and An with 0-2, 1 (6) setae. Cell m basally of RM with 39-70, 52 (8) setae.

Legs. Scale on front tibia including apical point 23-41, 31 µm (6) long. Spurs of middle tibia 34-49, 39 µm and 19-34, 27 µm long including combs; of hind tibia 34-56, 40 µm and 19-30, 25 µm long including comb. Width at apex of front tibiae 21-34, 26 µm; of middle tibiae 23-34, 28 µm; of hind tibiae 24-36, 30 µm. For lengths and proportions of legs see table 1.

Hypopygium (fig. 8). Tergal band of sinuous V-

Table 1. *Nandeva strixinorum*. Lengths (in µm) and proportions of legs (n=3 of front tarsomeres, 5 of mid and hind tarsomeres).

| | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ |
|---|---|---|---|---|---|---|
| $p_1$ | 340-520,425 | 274-463,379 | 387-491 | 236-246 | 151-161 | 85-99 |
| $p_2$ | 359-572,490 | 274-425,367 | 288-345,314 | 151-170,162 | 113-142,122 | 66-85,71 |
| $p_3$ | 378-572,494 | 369-595,501 | 350-421,388 | 188-222,205 | 180-218,196 | 94-123,109 |

| | $ta_5$ | LR | BV | SV | BR |
|---|---|---|---|---|---|
| $p_1$ | 38 | 0.99-1.18 | 2.34-2.51 | 1.73-2.06 | 3.8-4.8 (2) |
| $p_2$ | 38-47 | 0.77-0.83,0.80 | 2.90-3.21,3.07 | 2.74-3.07,2.88 | 5.3-5.7 (3) |
| $p_3$ | 43-52,49 | 0.69-0.79,0.73 | 2.49-2.61,2.53 | 2.50-2.83,2.71 | 6.0-7.5 (3) |

type, widely separated. Tergite IX with 14-22,18 setae at base of anal point; laterosternite with 4-7, 7 setae. Anal point 40-66, 52 µm long; 3-4 µm wide at base. Phallapodeme 47-73, 65 µm long; transverse sternapodeme 14-23, 16 µm long, without oral projections. Gonocoxite 71-111, 91 µm long; gonostylus 73-107, 93 µm long. Superior volsella with 24-30, 26 µm long base with 1-3, 2 strong apicolateral setae; and 26-31, 27 µm long, 3-6, 4 µm wide extension with 2-3 apical and 0-1 median setae on inner margin, bare without microtrichia; inferior volsella 45-69, 59 µm long with 3-4 apical setae and 6-8 scattered basal setae. HR 0.88-1.09, 0.98; HV 1.79-2.45, 2.10.

Remarks – The material may contain more than one species. The specimens are exceedingly small and delicate and the coloration is obscured by preservation in ethanol. The specimens from Jaraguá have setae on the subcosta and two of the specimens from Cananéia are considerably smaller.

Ecology. – *Nandeva strixinorum* was collected at the same locality as *N. latiloba*.

### *Nandeva* cf. *tropica* Wiedenbrug, Reiss & Fittkau (fig. 10)

*N. tropica* Wiedenbrug, Reiss & Fittkau, 1998: 64.

Material examined. BRAZIL: 1♂, Amazonas, Rio de Janeiro, Nova Freiburgo, Caledonia (reservoir), Rio Cascatinha, 24.viii.1995, E. J. Fittkau (ZSM); 1♂, Maranhão, Res. Aldeia Escalvado, 6°S, 54°W, 2♂, 8.iv.1991, E. J. Fittkau (ZSM). – PANAMA: 1♂, Barro Colorado Island, 6.ii.-25.iii.1986, H. Malicky (ZSM).

Diagnostic characters. – The banded abdomen combined with the low antennal ratio will separate the species from other members of the genus.

**Male imago** (n = 2-3 except when otherwise stated)

Total length 2.03-2.11 mm. Wing length 0.87-1.08 mm. Total length/wing length 1.96-2.34. Wing length/length of profemur 2.04-2.35. Abdomen brown with posterior ⅔ of tergites pale; thorax with pale ground colour and dark brown vittae, anepisternum, preepisternum and postnotum and light brown scutellum; legs banded as in *N. strixinorum*.

Head. AR 0.30-0.35. Ultimate flagellomere 101-113 µm long, apical seta lost. Temporal setae 15-17, including 8-10 inner verticals, 2-4 outer verticals and 3 postorbitals. Clypeus with 10-11 setae. Lengths of palpomeres (in µm): 23-26, 34, 79-154, 90-141, 173-191. Third palpomere with 5 distinctly lanceolate 19 µm long sensilla clavata in pit. Tentorium 79-105 µm long, 21-34 µm wide.

Thorax. Antepronotum with 2 anteromedian and 2-3 lateral setae. Dorsocentrals 12-21, 17 (4); acrostichals 11-18, 15 (4); prealars 4-5, 4 (4). Scutellum with 6-9, 7 (4) setae.

Wing. VR 1.37-1.39. Brachiolum with 2 setae, Sc bare, M with 8-15 setae, R with 27-29 setae, $R_1$ with 27-29, $R_{4+5}$ with 35-44, $M_{1+2}$ with 42-48, $M_{3+4}$ with 28-29, Cu with 25-30, $Cu_1$ with 9-13, postcubitus with about 40-55, and An with 0-10 setae. Cell m basally of RM with about 40-70 setae. Squama apparently with 2-3 minute setae.

Legs. Spur of front tibia apparently 26 µm long, spurs of mid tibia 30-49 µm and 15-19 µm long including comb, spurs of hind tibia 26-49 µm and 19-23 µm long including comb. Width at apex of front tibiae 23-28 µm, of middle tibiae 28-36 µm, of hind tibiae 23-38 µm. Lengths (in µm) of front to hind femora as: 321-458, 312-529, 331-529; of front to hind tibiae: 331-458, 246-416, 340-589.

Hypopygium (n=4, fig. 10). Tergal band of evenly curved, not sinuous V-type, widely separated. Tergite IX with 16-20,14 setae at base of anal point. Anal point 36-55, 46 µm long, about 6 µm wide at base. Phallapodeme 59-71, 66 µm long; transverse sternapodeme 12-24, 19 µm long. Gonocoxite 59-98, 76 µm long; gonostylus 62-88, 73 µm long. Superior volsella with 17-26, 21 µm long base with 2-3 apicolateral setae; and 17-23, 20 µm long; 2-4, 3.5 µm wide extension with 2 apical and 1 median seta on tubercle on inner margin, without microtrichia; inferior volsella 43-60, 50 µm long with about 3 apical setae and 5 weak median setae. HR 0.93-1.11, 1.04; HV 2.01-2.34 (2).

Remarks – The specimens from Brazil described here are all from the same localities and collected at the same dates as the pupal exuviae types and we assume that they belong to *N. tropica*. However, the specimen from Panama has a less distinct banding on the posterior tergites, is lacking the antenna and could conceivably belong to a separate species.

**Larvae of *Nandeva***

The Fazzari locality in São Carlos has been sampled extensively for several years including rearing of larvae. However, we have not been able to associate any larvae with *Nandeva*. The only two larvae of Tanytarsini present in the Fazzari locality consist of a larva similar, but not identical to that described as Tanytarsini Genero C by Trivinho-Strixino & Strixino (1995) and an apparent *Constempellina* Brundin, 1947. The first has a 90 µm long, antennal pedicel, including a 21 µm long Lauterborn organ, constricted at 45 µm from base, and clypeal seta (S3) plumose, with about 10 branches, 59 µm long. Although it could be expected that the larva of *Nandeva* would be more reduced or aberrant the larva does not change any of the parsimony analyses below when regarded as the larva of *Nandeva*. However, most likely it is a *Caladomyia* Säwedal, 1981. The second larva has elaborate branched and toothed S3 setae and also the anterior setae of thorax branched and toothed, but otherwise is a typical *Constempellina*.

The species of *Nandeva* are extremely small and delicate so their larvae could still be present in 'normal' localities. However, judging on the reduced nature of imagines and pupae the larvae are likely to be terrestrial or found in more unusual habitats.

## Parsimony analysis of the tribe Tanytarsini

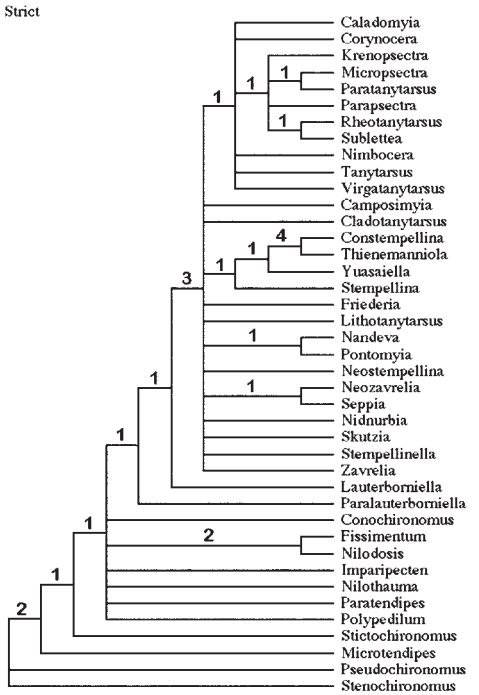
The combination of characters found in *Nandeva*, although apparently showing a placement in Tanytarsini, makes a placement in subtribes, not only of *Nandeva* but also of *Friederia* and *Seppia*, uncertain. It may also be desirable to demonstrate the monophyly of the tribe Tanytarsini. Accordingly a parsimony analysis is performed for all genera of Tanytarsini with the exceptions of *Himatendipes* Tokunaga, 1959 and *Goetghebueria* Kieffer, 1921, which both according to Ashe (1983) are said to be likely synonyms of *Micropsectra*. Also included in the analysis are *Pseudochironomus* Malloch, 1915 and most of the presumed basal genera of the Chironomini, including those mentioned by Cranston (1999) as possible sister genera of *Nandeva*. The scoring of characters mostly is based on Pinder & Reiss (1983, 1986), Cranston et al. (1989), Sæther (1977) and Sæther et al. (2000) supplemented with descriptions of non-Holarctic genera and species in Reiss (1972, 1984), Lehmann (1973), Säwedal (1981, 1982), Tokunaga (1938), Trivinho-Strixino & Strixino (1995, 2000), Ekrem & Reiss (1999), Reiff (2000), Epler (2001) etc., as well examination of some material in the collection of the Museum of Zoology in Bergen.

Table 2 presents the characters and states with comments used in the phylogenetic analyses. Characters 47, 55, 74, 91 and 95 were ordered, the remaining multi-state characters unordered. In some analyses characters 14, 16, 20, 44, 55, 68, 73, 76, and 97 were given a weight of 20; characters 15, 25, 29, 31, 37, 45, 47, 48, 56, 71, 75, 78, 83, 92 and 98 a weight of 10; and characters 4, 11, 23, 26, 32, 39, 42, 43, 51, 53, 54, 60, 61, 64, 69, 70, 72, 74, 80, 86, 90, 91, 93, 94, 95, 96, 100, 102 a weight of 5 (see table 2). In other analyses the first-mentioned characters all were given a weight of 10. The data matrix also was analysed excluding all other characters than the above-mentioned ones.

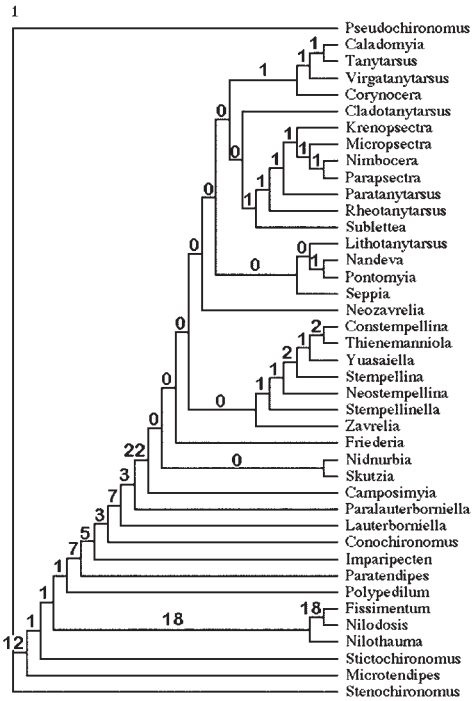
The higher weighed characters are characters, which previously have been used to separate genera, have character states with little variation and are regarded as highly significant. The characters given a weight of 20 all are potentially objective synapomorphies in the sense of Sæther (1985) for larger groups, while the characters given a weight of 10, although also potentially objective synapomorphies, are given slightly lower weight since they either are objective only within the Tanytarsini, uncertain for several taxa or clearly not fully objective synapomorphies. The higher weighted characters are further discussed in table 2. Characters given a weight of 5 are characters, which have proven valuable in other analyses although showing some variation and some secondary reductions (Sæther 1975, 1976, 1977, 1983a, b, 1986, 1990a, b, c, 2000b, Sæther & Wang 1996, Sæther & Andersen 1998, 2003, Sæther & Sundal 1999, Ekrem & Sæther 2000, Sæther & Kyerematen 2001, Vårdal et al. 2002). There are numerous apparent autapomorphies and possible synapomorphies not included in the analyses since they are unknown or uncertain for most of the genera. The most important of these characters are found in the labral and head capsule setae and sclerites of the larvae, and in the female genitalia.

The data matrix was analysed with *Pseudochironomus* Malloch, 1915 as outgroup. The tribe Pseudochironominae, including the speciose genus *Pseudochironomus* and a few other genera with fewer species and less well known stages, has been shown to form a monophyletic sister group to the Chironomini or at least a paraphyletic basal group within the Chironomini and Pseudochironomini combined (Sæther 1977, Cranston 2003). The data matrix was analysed both including and excluding all genera with unknown immatures. Some results are shown in figs. 11-14.

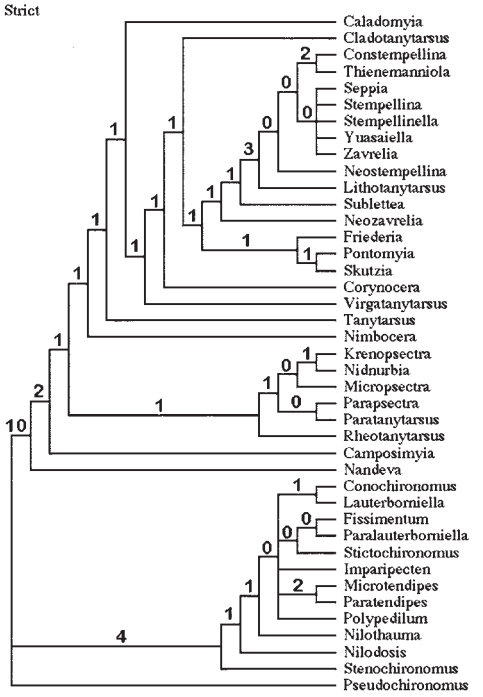
When characters are given equal weight, the analy-


Strict
Caladomyia
Corynocera
Krenopsectra
Micropsectra
Paratanytarsus
Parapsectra
Rheotanytarsus
Sublettea
Nimbocera
Tanytarsus
Virgatanytarsus
Camposimyia
Cladotanytarsus
Constempellina
Thienemanniola
Yuasaiella
Stempellina
Friederia
Lithotanytarsus
Nandeva
Pontomyia
Neostempellina
Neozavrelia
Seppia
Nidnurbia
Skutzia
Stempellinella
Zavrelia
Lauterborniella
Paralauterborniella
Conochironomus
Fissimentum
Nilodosis
Imparipecten
Nilothauma
Paratendipes
Polypedilum
Stictochironomus
Microtendipes
Pseudochironomus
Stenochironomus

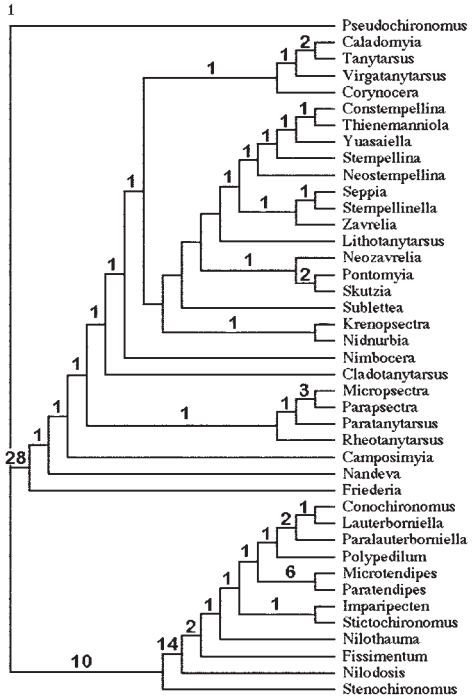
11


1
Pseudochironomus
Caladomyia
Tanytarsus
Virgatanytarsus
Corynocera
Cladotanytarsus
Krenopsectra
Micropsectra
Nimbocera
Parapsectra
Paratanytarsus
Rheotanytarsus
Sublettea
Lithotanytarsus
Nandeva
Pontomyia
Seppia
Neozavrelia
Constempellina
Thienemanniola
Yuasaiella
Stempellina
Neostempellina
Stempellinella
Zavrelia
Friederia
Nidnurbia
Skutzia
Camposimyia
Paralauterborniella
Lauterborniella
Conochironomus
Imparipecten
Paratendipes
Polypedilum
Fissimentum
Nilodosis
Nilothauma
Stictochironomus
Microtendipes
Stenochironomus

12


Strict
Caladomyia
Cladotanytarsus
Constempellina
Thienemanniola
Seppia
Stempellina
Stempellinella
Yuasaiella
Zavrelia
Neostempellina
Lithotanytarsus
Sublettea
Neozavrelia
Friederia
Pontomyia
Skutzia
Corynocera
Virgatanytarsus
Tanytarsus
Nimbocera
Krenopsectra
Nidnurbia
Micropsectra
Parapsectra
Paratanytarsus
Rheotanytarsus
Camposimyia
Nandeva
Conochironomus
Lauterborniella
Fissimentum
Paralauterborniella
Stictochironomus
Imparipecten
Microtendipes
Paratendipes
Polypedilum
Nilothauma
Nilodosis
Stenochironomus
Pseudochironomus

13


1
Pseudochironomus
Caladomyia
Tanytarsus
Virgatanytarsus
Corynocera
Constempellina
Thienemanniola
Yuasaiella
Stempellina
Neostempellina
Seppia
Stempellinella
Zavrelia
Lithotanytarsus
Neozavrelia
Pontomyia
Skutzia
Sublettea
Krenopsectra
Nidnurbia
Nimbocera
Cladotanytarsus
Micropsectra
Parapsectra
Paratanytarsus
Rheotanytarsus
Camposimyia
Nandeva
Friederia
Conochironomus
Lauterborniella
Paralauterborniella
Polypedilum
Microtendipes
Paratendipes
Imparipecten
Stictochironomus
Nilothauma
Fissimentum
Nilodosis
Stenochironomus

14

sis yields 120 trees, each with 792 steps, a consistency index (CI) of 0.49, retention index (RI) of 0.58 and rescaled consistency index (RC) of 0.28 (fig. 11). Analysis with successive reweighing based on RC gives 1 tree, of 800 steps (when character weights are reset to 1), CI 0.54, RI 0.80 and RC 0.43 (fig. 12). With the different characters given weights of 20, 10 and 5 as mentioned above, the analysis yields 15 trees each with 830 steps (when character weights are reset to 1), CI 0.50, RI 0.70 and RC 0.35 (fig. 13). Analysis with successive reweighing based on RC results in 1 tree of 830 steps, CI 0.49, RI 0.79 and RC 0.39 (fig. 14). The Bremer supports for each branch, when character weights are reset to 1, is indicated in figs. 11-14 as numbers above the branches. For the weighted and reweighed trees the supports are adjusted to the shortest tree. Except for the support for the Tanytarsini such supports usually are low when characters are unweighed and not reweighed. When the characters are weighed and/or reweighed the supports often are very high. The bootstrap values when characters are unweighed and the results not reweighed are 90 % for the Tanytarsini, 90 % for *Constempellina* plus *Thienemanniola* Kieffer, 1921; 78 % for *Constempellina*, *Thienemanniola*, *Yuasaiella* Tokunaga, 1938 plus *Stempellina*; 72 % for *Fissimentum* Cranston & Nolte, 1996 plus *Nilodosis* Kieffer, 1921; and below 70 % for other divisions. After successive reweighing, the tribe Tanytarsini is supported by a value of 100 %. Other values are 90 % for *Constempellina* plus *Thienemanniola*; 90 % for the Tanytarsini plus *Lauterborniella* Thienemann & Bause, 1913; *Paralauterborniella* Lenz, 1941, *Conochironomus* Freeman, 1961, and *Imparipecten* Freeman, 1961; 80 % for *Fissimentum*, plus *Nilodosis*; 80 % for the Tanytarsini plus *Lauterborniella* and *Paralauterborniella* Lenz, 1941; 80 % for all except *Pseudochironomus* and *Stenochironomus* Kieffer, 1919; and less than 70 % for remaining divisions. When some characters are weighted bootstrap values of 80 % for *Constempellina* plus *Thienemanniola,* 77% for *Krenopsectra* Reiss, 1969 plus *Nidnurbia* Säwedal, 1982; 70 % both for the Tanytarsini and for the included Chironomini; and 60 % are found for *Microtendipes* Kieffer, 1915 plus *Paratendipes* Kieffer, 1911. The result after successive reweighing gives bootstrap values of 90% for Tanytarsini; 80 % for *Constempellina* plus *Thienemanniola*; 77 % for *Microtendipes* plus *Paratendipes*; 77 % for *Micropsectra*, *Parapsectra* Reiss, 1969 plus *Paratanytarsus*; 60 % for *Fissimentum* plus *Nilodosis*; and lower than 60 % for all other combinations. When character weights of 10 and 5 are used the results are similar to those shown in Fig. 12, but *Seppia, Friederia* and *Skutzia* Reiss, 1985 are included in Zavreliina, and *Nidnurbia* is in the *Micropsectra* group before reweighing, close to *Cladotanytarsus* Kieffer, 1921 after reweighing. When only the characters with weights higher than 1 are included in a parsimony analysis, the results are similar to those shown in fig. 13, but *Nandeva* together with *Friederia*, *Pontomyia* Edwards, 1926 and *Skutzia* form an unresolved basal group. In the reweighed results *Nandeva* forms the sister group of the *Tanytarsus* plus the *Micropsectra* groups, and *Cladotanytarsus* and *Nidnurbia* are included in the *Micropsectra* group.

The results are rather ambiguous. However, the tribe Tanytarsini is monophyletic and well supported in all analyses. Furthermore both the subtribe Zavreliina and a *Micropsectra* group are present in all analyses, but some genera sometimes are members of these groups sometimes not. A core group within the subtribe Tanytarsina is recognisable in the reweighed analyses. The placement of *Nandeva* varies between basal in the Tanytarsini to a basal member of the *Micropsectra* group or sister genus of either *Pontomyia* or *Lithotanytarsus*.

It could be assumed that giving higher weight to some characters would influence the outcome of the analysis in the direction of already established classifications, in this case the division of the Tanytarsini in subtribes and groups. This does not seem to be the case. If it influences anything it is the genera in the outgroup. For the Tanytarsini the result mostly in accordance with previous ideas is the result from reweighing of the unweighed data (Fig. 12). Inclusion or exclusion of especially plesiomorphous but aberrant taxa has a much higher influence (see for instance Sæther, 1989).

The different cladograms can be examined in MacClade with characters reset to equal weights. (However, the number of steps is counted differently in MacClade and in PAUP.) The unweighed tree becomes three steps shorter by placing *Nandeva* as the sister species of the rest of the Tanytarsini, two steps shorter by placing the genus as sister steps of the group containing *Mi-*

Figs. 11-14. Parsimony analysis of the tribe Tanytarsini of the subfamily Chironominae with *Pseudochironomus* Malloch as outgroup. Characters 47, 55, 74, 91 and 95 ordered, the remaining unordered. Bremer supports for each branch, when character weights are reset to 1, given as numbers above the branches. – 11, Strict consensus of shortest trees without weighting of characters; 12, Cladogram obtained from fig. 11 after successive reweighting according to the rescaled consistency index; 13, Strict consensus of shortest trees using weighting of characters (20, 10 and 5) as specified in text; 14, Cladogram obtained from fig. 13 after successive reweighting according to the rescaled consistency index.

*cropsectra* and *Tanytarsus*, equally long by regarding *Lithotanytarsus* instead of *Pontomyia* as the sister genus. If *Nandeva* in the reweighed cladogram is placed basally in the Tanytarsini the length of the cladogram is increased by 6 steps, any other placement increases the length by at least 4 steps. In the weighed cladogram (fig. 13) the length remains the same by placing *Nandeva* anywhere in the group including *Pontomyia* or as its sister group, is increased by one step by placing it as sister group of either *Lithotanytarsus* or the Zavreliina, by two steps by placing it as sister genus of *Sublettea* Roback, 1975 or of *Lithotanytarsus* plus *Sublettea*, and by at least 5 steps by placing it anywhere else in the cladogram. In the weighed and reweighed cladogram (fig. 14) the length of the cladogram is increased by 3 steps if *Lithotanytarsus* is regarded as the sister group or if *Nandeva* is placed basally in the Tanytarsini, increased by 4 steps if *Pontomyia* and or *Skutzia* is regarded as the sister group, and by 6 or more steps by placing it anywhere else in the cladogram.

Of the included characters two are unique synapomorphies: character 14(1) for the Tanytarsini, that wing vein RM is parallel to $R_{4+5}$ and continuous with it; and character 47(1), the presence of a floor under the female vagina. However, there are numerous apomorphies, which just occur inside the tribe (underlying synapomorphies), there are apomorphies, which occur in all members of the tribe, but also in a few genera outside; and there are apomorphies mostly limited to the tribe. Among the genera included in the analysis reduced number of flagellomeres and reduced dorsomedian eye extension occur only inside Tanytarsini [character 1(1), character 4(1)]. Hairy (or reduced) wing [character 11(1, 2)], high venarum ratio [character 13(1, 2)], bare squama [character 15(1)], anteriorly tapered tergite VIII [character 25(1)], simple or lacking thoracic horn of the pupa [character 54(0)], five segments in the larval antenna [character 73(0)] and presence of pecten mandibularis [character 86(0)] are common to all or nearly all Tanytarsini and absent or nearly absent outside the tribe.

The tribe Tanytarsini includes three main groups, the subtribe Zavreliina and the subtribe Tanytarsina that can be divided in a *Micropsectra* group and a *Tanytarsus* group. At least the first two of these groups each have a consistent core of genera in all analyses, while the last mostly is paraphyletic. The *Tanytarsus* group combined with either the Zavreliina or the *Micropsectra* group usually is or could be monophyletic. In addition there are a number of genera of variable placement. The difference between the different results of parsimony analyses primarily is a consequence of lacking knowledge of the female imagines and immature stages. *Cladotanytarsus* and *Nimbocera* Reiss, 1972 are the only genera of variable placement of which all stages are known. They both are members of the *Tanytarsus* group when characters not are reweighed, of the *Micropsectra* group when characters are reweighed. We regard the undivided female gonapophysis VIII and the few premandibular teeth [characters 41(1) and 80(0)] as decisive and a placement in the *Tanytarsus* group as relatively certain. The subtribe Zavreliina in its strictest sense is monophyletic in all analyses, but internal relationships may vary. *Seppia* is included in the subtribe when characters are weighted. The costa ending well proximal of $M_{3+4}$ in the subtribe in its strictest sense [character 16(1)] speaks for the inclusion of *Seppia*, and also of *Nandeva* and *Lithotanytarsus* Thienemann, 1933. The subtribe is most clearly characterised by features found in the immatures such as presence of pedes spurii A in the pupa [character 61(0)], except in *Neostempellina*); absence of patches or band of spines on pupal tergite II [character 62(0)]; prominent apical spur or palmate process on antennal pedestal of the larva [character 74(1)]; shape of mentum and ventromentum of the larvae (characters 91, 96, 97); and the mostly sclerotized procercus with some anal setae split or plumose, sometimes with spines [character 99(1)].

*Rheotanytarsus* Thienemann & Bause, 1913, *Paratanytarsus, Micropsectra* and *Parapsectra* always are member of a clade which usually also includes *Krenopsectra* and *Sublettea* and sometimes a number other genera. All genera with known females have divided gonapophysis VIII [character 44(1)] which would speak for the inclusion of *Nandeva* in this group. The known larvae of the group also have only 1-2 teeth on the premandible ([character 80(0)].

*Tanytarsus*, *Caladomyia*, *Virgatanytarsus* Pinder, 1982 and *Corynocera* Zetterstedt, 1837 usually are members of a clade, often including a number of other genera. The group is mostly characterised by plesiomorphies such as costa ending distal of apex of $M_{3+4}$ [character 16(1)] and the separate tibial combs [character 20 (0)]. The conspicuously long microtrichia on the undivided gonapophysis VIII [character 45(1)] is a synapomorphy, but the character state occurs also in the Zavreliina. The long pedicels of the Lauterborn organs [character 76(2)] also is a synapomorphy, but this character state occurs also in the *Micropsectra* group. That the pecten epipharyngis consists of three separate or fused toothed scales or spines [character 82(1)] also is a synapomorphy again shared with some other genera.

It is easy to see the reason for the uncertain placement of several genera. *Friederia*, for instance, in most characters fits the Zavreliina. However, the costa ends far distal to apex of $M_{3+4}$, while in Zavreliina it ends proximal to apex of $M_{3+4}$. The reason why *Seppia* originally was placed in Zavreliina and why we at first thought that also *Nandeva* belonged there is that these genera, together with *Lithotanytarsus*, are the only

ones outside Zavreliina with the same retracted costa [character 16(1)]. The absence of a digitus [character 32(1)] was thought to represent a good synapomorphy for the Zavreliina. However, within Zavreliina *Thienemanniola* possesses a digitus; and *Friederia*, *Pontomyia*, *Nandeva*, *Skutzia*, *Krenopsectr*a as well as some members of *Rheotanytarsus*, *Micropsectra* and *Tanytarsus* all lack a digitus. The absence of oral projections on the transverse sternapodeme [character 41(1)] is limited to the Zavreliina except *Constempellina*, as well as to *Friederia*, *Nidnurbia*, *Cladotanytarsus*, *Nandeva* and *Skutzia*. Rather unexpected is that, except for the presence of pedes spurii A [character 61(0)] in all Zavreliina except *Neostempellina*, and no patches or band of spines [character 62(0)] in all Zavreliina, there are no pupal characters characterising any group. The placement of *Nandeva* close to *Lithotanytarsus* and/or *Pontomyia* in several parsimony analyses primarily is a result of the reduced volsellae and the reduced pupal features found in these genera [e.g. character S32(2), 34(2), 51(2), 53(2), 54(2), 59(1), 69(2)]. The similarities are more likely to be homoplasies than synapomorphies.

Cranston (1999) placed *Nandeva* close to *Nilodosis* and *Fissimentum* in the Chironominae. However, he had only pharate adults and was not aware of the error in the drawing of the wing in Wiedenbrug et al. (1998). Nevertheless, he also mentions the similarity of *Nandeva* to *Lithotanytarsus* explaining this as homoplasy, and, as we do, regarded the angle of wing vein RM as the principal synapomorphy for the tribe Tanytarsini. The parsimony analysis does not appear to give much more information than a manual Hennigian analysis would do. The weighing of characters found especially important has limited influence on the Tanytarsini except for placing *Nandeva* at the base, but has apparently greater influence within the basal Chironomini. All findings essentially are in accordance with the phylogeny presented in Sæther (1977). However, the analyses also clearly show that further investigations, particularly of the female genitalia and the larval morphology, are needed in order to arrive at more final conclusions.

## Notes on zoogeography

Cranston (1999) suggested that the distribution of *Nandeva* may show a warm-eurytopic Gondwanan distribution as found recently in several genera and species groups of chironomids (Sæther 2000a). In Australia *Nandeva* so far is found only in the wet tropical North Queensland. However, in South America *Nandeva* has been found both in Patagonia (cool Gondwanan) and in Brazil (warm Gondwanan), unlike other genera which either are in western South America and Australia-New Zealand (cool stenothermic, transantarctic Gondwanan), or in eastern South America, Africa and South Asia (warm eurytopic Gondwanan or Inabrezian). The present paper also includes a record from Panama suggesting that the genus could be present in western North America. The distribution can be explained in three ways: a transantarctic, cool stenothermic Gondwanan connection; a northern, warm eurytopic Gondwanan connection or a Beringian connection. Among chironomids there are no examples of genera showing transantarctic Gondwanan connection with distribution limited to tropical areas of Australia and also occurring in the tropical areas of Brazil. There also are no examples of northern warm Gondwanan connections with some species occurring in Southern Chile or any northern connection between Australia and South America. If a true warm Gondwanan connection is to be confirmed the genus should be found in South Asia and Africa. If a Beringian connection is more likely it should be present in South Asia, East Asia and North America.

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## References

Ashe, P., 1983. A catalogue of chironomid genera and subgenera of the world including synonyms (Diptera: Chironomidae). – Entomologica Scandinavica, Supplement 20: 1-68.

Cranston, P. S., 1999. Two unusual Chironomini (Diptera: Chironomidae) from Australian rainforest streams: One new genus and a neotropical genus new for the region. – Australian Journal of Entomology 38: 291-299.

Cranston, P. S., 2003. The oriental genus *Shangomyia* Sæther & Wang (Chironomidae: Diptera): Immature stages, biology, putative relationships and the evolution of wood mining in chironomid larvae. – The Raffles Bulletin of Zoology 51: 179-186.

Cranston, P. S., M. E. Dillon, L. C. V. Pinder & F. Reiss, 1989. The adult males of Chironominae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. – In: T. Wiederholm (ed.), Chironomidae of the Holarctic region. Keys and diagnoses, 3. Adult males – Entomologica Scandinavica, Supplement 34: 353-502.

Ekrem, T. & F. Reiss, 1999. Two new *Tanytarsus* species (Diptera: Chironomidae) from Brazil, with reduced median volsella. – Aquatic Insects 21: 205-213.

Ekrem, T. & O. A. Sæther, 2000. *Seppia*, a new Afrotropi-

cal tanytarsine genus (Diptera: Chironomidae). – In: O. Hoffrichter, (ed.), Late 20th century research on Chironomidae. An anthology from 13th international symposium on Chironomidae. – Shaker Verlag, Aachen: 79-87.

Epler, J., 2001. Identification manual for the larval Chironomidae (Diptera) of North and South Carolina. A guide to the taxonomy of the midges of the southeastern United States, including Florida. – Special Publication SJ2001-SP13. North Carolina Department of Environment and Natural Resources, Raleigh, NC, and St. Johns River Water Management District, Palatka, FL. 526 pp.

Lehmann, J., 1973. Systematische und phylogenetische Studie über die Gattungen *Thienemanniola* Kieffer und *Corynocera* Zetterstedt (Diptera, Chironomidae). – Hydrobiologia 43: 381-414.

Maddison, W. R. & D. R. Maddison, 1999. MacClade: Analysis of phylogeny and character evolution. Version 3.08. – Sinauer Associates, Sunderland, Massachusetts.

Pinder, L. C. V. & F. Reiss, 1983. The larvae of Chironominae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. – In: T. Wiederholm, (ed.), Chironomidae of the Holarctic region. Keys and diagnoses. Part 1. Larvae. – Entomologica Scandinavica, Supplement 19: 293-435.

Pinder, L. C. V. & F. Reiss, 1986. The pupae of Chironominae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. – In: T. Wiederholm, (ed.), Chironomidae of the Holarctic region. Keys and diagnoses.2. Pupae. – Entomologica Scandinavica, Supplement 28: 299-456.

Reiff, N., 2000. Review of the mainly Neotropical genus *Caladomyia* Säwedal. 1981, with descriptions of seven new species (Insecta, Diptera, Chironomidae, Tanytarsini). – Spixiana 23: 175-198.

Reiss, F., 1972. Die Tanytarsini (Chironomidae, Diptera) Südchiles und Westpatagoniens. Mit Hinweisen auf die Tanytarsini-Fauna der Neotropis. – Studies on the Neotropical Fauna 7: 49-94.

Reiss, F., 1984. *Neostempellina thienemanni* n. gen., n. sp., eine europäische Chironomide mit gehäusetragenden Larven. – Spixiana 7: 203-210.

Sæther, O. A. 1975. Nearctic and Palearctic *Heterotrissocladius* (Diptera: Chironomidae). – Bulletin of the Fisheries Research Board of Canada 193: 1-67.

Sæther, O. A. 1976. Revision of *Hydrobaenus* Fries, *Trissocladius* Kieffer, *Zalutschia* Lipina, *Paratrissocladius* Zavrel and some related genera (Diptera: Chironomidae). – Bulletin of the Fisheries Research Board of Canada 195: 1-287.

Sæther, O. A., 1977. Female genitalia in Chironomidae and other Nematocera: morphology, phylogenies, keys. – Bulletin of the Fisheries Research Board of Canada 197: 1-209.

Sæther, O. A. 1983a. Three new species of *Lopescladius* Oliveira, 1967 (syn. "*Cordites*" Brundin 1966, n. syn.) with a phylogeny of the *Parakiefferiella* group. – Memoirs of the American entomological Society 34: 279-298.

Sæther, O. A. 1983b. The canalized evolutionary potential: inconsistencies in phylogenetic reasoning. – Systematic Zoology 32: 343-359.

Sæther, O. A., 1986. The myth of objectivity – post-Hennigian deviations. – Cladistics 2: 1-13.

Sæther, O. A., 1990a. Midges and the electronic Ouija board. The phylogeny of the *Hydrobaenus* group revised (Chironomidae, Diptera). – Zeitschrift für zoologische Systematik und EvolutionsForschung 28:107-136.

Sæther, O. A., 1990b. A review of the genus *Limnophyes* Eaton from the Holarctic and Afrotropical regions (Diptera: Chironomidae, Orthocladiinae). – Entomologica Scandinavica, Supplement 35: 1-139.

Sæther, O. A. 1990c. Phylogenetic trends and their evaluation in chironomids with special reference to orthoclads. – Acta Biologica Debrecina, Supplementum Oecologica Hungarica 2: 53-75.

Sæther, O. A., 2000a. Zoogeographical patterns in the Chironomidae (Diptera). – Verhandlungen der internationale Vereinigung für theoretische und angewandte Limnologie 27: 290-302.

Sæther, O. A., 2000b. Phylogeny of the subfamilies of Chironomidae (Diptera). – Systematic Entomology 25: 393-403.

Sæther, O. A. & Wang, 1996. Revision of the orthoclad genus *Propsilocerus* Kieffer (= *Tokunagayusurika* Sasa) (Diptera: Chironomidae). – Entomologica Scandinavica 27: 441-479.

Sæther, O. A. & T. Andersen, 1998. *Friederia*, a new Afrotropical tanytarsine genus (Diptera: Chironomidae. – Entomologica Scandinavica 29: 29-37.

Sæther, O. A. & A. Sundal, 1999. *Cerobregma*, a new subgenus of *Polypedilum* Kieffer. With a tentative phylogeny of subgenera and species groups within *Polypedilum* (Diptera: Chironomidae). – Journal of the Kansas Entomological Society 71 (1998): 315-382.

Sæther, O. A., P. Ashe & D. E. Murray, 2000. Family Chironomidae. – In: L. Papp, & B. Darvas (eds), Contributions to a Manual of Palaearctic Diptera (with special reference to the flies of economic importance), 4. Appendix A. 6. – Science Herald, Budapest: 113-334.

Sæther, O. A. & R. K. A. Kyerematen, 2001. Towards phylogeny and zoogeography of the genus *Rheotanytarsus* Thienemann et Bause, 1913 (Diptera: Chironomidae). – Tijdschrift voor Entomologie 144: 73-117.

Sæther, O. A. & T. Andersen, 2003. Redescription of *Rhinocladius* Edwards (Diptera: Chironomidae: Orthocladiinae). – Zootaxa 217: 1-20.

Säwedal, L., 1981. Amazonian Tanytarsini II. Description of *Caladomyia* n. gen. and eight new species (Diptera: Chironomidae). – Entomologica Scandinavica 12: 123-143.

Säwedal, L., 1982. Description of *Nidnurbia* n. gen. with notes on the distribution of *Micropsectra* Kieffer (Diptera: Chironomidae). – Entomologica Scandinavica 13: 317-320.

Swofford, D. L. L., 1998. PAUP. Phylogenetic analysis using parsiomony (and other methods). Version 4. Sinauer Associates, Sunderland, Massachusetts.

Tokunaga, M., 1938. Chironomidæ from Japan (Diptera), X. New or little-known midges, with descriptions of the metamorphoses of several species. – Philippine Journal of Science 65: 313-383.

Trivinho-Strixino, S. & G. Strixino, 1995. Larvas de Chironomidae (Diptera) do estado de São Paulo: Guia de identifacão e diagnose dos géneros. – Universidade Federal de São Carlos, Programa de pós-graduacãoem ecologia e recursos naturals: 1-229.

Trivinho-Strixino, S. & G. Strixino, 2000. A new species of genus *Caladomyia* Säwedal. 1981, with descriptions of the female and immature stages (Insecta, Diptera, Chironomidae). – Spixiana 23: 167-173.

Vårdal, H., A. Bjørlo & O. A. Sæther, 2002. Afrotropical

*Polypedilum* Kieffer subgenus *Tripodura* Townes with a review of the subgenus (Diptera: Chironomidae). – Zoologica Scripta 31: 331-402.
Wiedenbrug, S., F. Reiss, & E. J. Fittkau, 1998. *Nandeva*, gen. nov., a new genus of Chironomini. – Spixiana 21: 59-68.

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Table 2. Characters and states used in the phylogenetic analyses.

**Imagines**

1. Number of flagellomeres: (0) 13; (1) 6-12.
2. Antennal ratio: (0) higher than 1.5; (1) 0.85-1.5; (2) 0.6-0.84; (3) lower than 0.6.
– The great majority of species within the Tanytarsini show antennal ratios of 0.6-0.9. Lower ratios indicate reduction, higher ratios probably plesiomorphy. The same division, however, is not valid for other tribes or groups. Within the Chironominae, for instance, the 'normal' antennal ratios are much higher.
3. Eyes: (0) bare or with short pubescence; (1) hairy.
4. Dorsomedian eye extension: (0) present; (1) absent.
5. Frontal tubercles: (0) small to well developed; (1) absent.
6. Palp: (0) with 5 palpomeres; (1) with 2-3 palpomeres.
7. Scutal tubercle: (0) absent; (1) present.
8. Antepronotum: (0) moderately to well developed, scutum not overreaching antepronotum; (1) reduced, scutum overreaching antepronotum.
9. Acrostichals: (0) present; (1) absent.
10. Anal lobe: (0) moderately developed to reduced, but wing not completely cuneiform; (1) wing cuneiform with margin at anal lobe straight or nearly straight or wing reduced.
11. Setae on wing membrane in male: (0) present; (1) absent.
12. Setae on wing membrane in male: (0) numerous over most of wing; (1) base with none or few.
– Absence scored as '?'.
13. VR: (0) 1.2 or lower; (1) 1.2-1.5; (2) higher than 1.5.
– Within the Tanytarsini most species have a venarum ratio of 1.2-1.5. Lower ratios indicate plesiomorphy, higher ratios more advanced conditions. Like in character 2, the character states as delimited here do not seem to have a phylogenetic importance in other groups. In the Orthocladiinae, for instance, ratios lower than 1.1 are quite normal.
14. Wing vein RM: (0) oblique to $R_{4+5}$; (1) RM parallel to $R_{4+5}$ and continuous with it, or oblique if wing reduced.
– This character is regarded as the most important for separating the Tanytarsini and Chironomini.
15. Squama: (0) bare; (1) with setae.
16. Costa ends: (0) slightly proximal to, opposite or distal to apex of $M_{3+4}$; (1) well proximal of $M_{3+4}$.
– This character is regarded as perhaps the most important in separating the subtribes Zavreliina and Tanytarsina.
17. Apex of fore tibia: (0) without spur; (1) with spur.
18. Apex of fore tibia: (0) with short spur; (1) with conspicuously long spur.
– Absence of spurs scored as '?'.
19. Combs of mid and hind tibiae: (0) small to well developed, basally fused; (1) composed of free spinules, vestigial or absent.
20. Combs: (0) separated or absent; (1) contiguous or very narrowly separated.
21. Mid and hind tibiae: (0) with spurs; (1) without spurs.
22. Mid and hind tibiae: (0) each with 2 spurs; (1) 1 spur on mid tibia, 1-2 spurs on hind tibia.
– Absence of spurs scored as '?'.

23. Tarsal sensilla chaeticae: (0) present; (1) absent.
24. Pulvilli: (0) present; (1) absent.
25. Tergite VIII: (0) not tapered anteriorly; (1) tapered anteriorly.
– The tapered tergite VIII is common to all Tanytarsini. It occurs, however, also in a few genera of the Chironomini including the large genus *Polypedilum* Kieffer, 1912.
26. Anal tergite bands: (0) transverse, short or absent; (1) V-type; (2) Y-, T- or H-type.
– The V- type differs from the other, less common types, by lacking the longitudinal band or bands.
27. Lateral tooth or projection of anal tergite: (0) absent; (1) present.
28. Anal point: (0) triangular, tapering or absent; (1) broad, at least basally parallel-sided; (2) narrow, parallel-sided or spatulate.
29. Anal point crests: (0) absent; (1) small; (2) well developed.
30. Anal point: (0) long; (1) short or absent.
31. Anal point: (0) without spinules or tuft of setae; (1) with spinules or tuft of special setae; (2) with rod-like structures.
32. Digitus: (0) present; (1) absent.
– Together with character 16 the presence or absence of a digitus separates most Zavreliina from most Tanytarsina. However, the division is not quite clear-cut.
33. Superior volsella: (0) partly or fully microtrichose; (1) bare.
34. Superior volsella: (0) without digitiform extension; (1) with long or short digitiform extension.
35. Superior volsella: (0) of differing shape, but longest axis not transverse; (1) ovoid to rectangular with transverse axis at least as long as longitudinal axis.
– The shape of the superior volsella potentially contains several synapomorphies and is characteristic for several genera, species groups and species. However, variation within several genera is too great to render the character very useful on the generic level. The exceptions are characters 34 and 35.
36. Apical setae of median volsella: (0) not broadly lamelliform or plate-like or median volsella absent; (1) some broadly lamelliform to plate-like.
37. Setae of median volsella: (0) not cochleariform or spoon-shaped; (1) with some cochleariform or spoon-shaped setae.
38. Setae of median volsella: (0) not distally split or branched; (1) some split or branched.
39. Median volsella: (0) short, usually not more than 2-3 times as long as broad; (1) long, mostly slender, several times longer than broad; (2) absent or vestigial.
40. Gonostylus: (0) as long as or longer than gonocoxite; (1) distinctly shorter than gonocoxite.
41. Sternapodeme: (0) with oral projections or at least sharp corners; (1) without projections.
42. Female tergite IX: (0) rounded to moderately triangular; (1) strongly triangular or with a posteromedian sharply triangular extension.
43. Gonocoxite IX: (0) moderately to well developed, protruding; (1) small or reduced.
44. Gonapophysis VIII: (0) undivided or ventrolateral lobe vestigial; (1) divided.
- In many groups of chironomids the variation in gonapophysis VIII is quite large. However, within the Tanytarsini there appear to be only two types, each with very little variation, one with undivided gonapophysis and one with gonapophysis clearly divided into equal-sized lobes. All genera with known females previously assigned to Zavreliina have a single gonapophysis. The divided gonapophysis are among genera with described females limited to *Rheotanytarsus*, *Paratanytarsus*, *Micropsectra*, *Parapsectra* and *Nandeva*.
45. Undivided gonapophysis VIII: (0) with non-conspicuous apical microtrichia; (1) apical microtrichia conspicuously long.
– Divided gonapophysis scored as '?'.
46. Ventrolateral lobe of gonapophysis VIII: (0) absent or not paintbrush-like; (1) paintbrush-like.
47. Floor: (0) very small or absent; (1) moderate size; (2) large.
48. Notum: (0) less than 1.5 times as long as seminal capsules; (1) at least 1.5 times as long as seminal capsules.
– Within Tanytarsini a long notum is apparently limited to the Tanytarsina and with the exception of *Nandeva*, with a short notum and a divided gonapophysis, and *Pontomyia*, with a long notum and an undivided gonapophysis, to the same genera which have a divided gonapophysis VIII.
49. Spermathecal ducts: (0) straight or nearly straight; (1) with strong bend or loop.

Pupae

50. Frontal apotome: (0) smooth or wrinkled; (1) rugose.
51. Cephalic tubercles: (0) present; (1) absent.
52. Frontal tubercles, warts, processes or swellings: (0) absent; (1) present.
53. Frontal setae: (0) long or very robust; (1) short, not robust; (2) absent.
54. Thoracic horn: (0) present; (1) absent.
– Reduced pupal characters such as loss of thoracic horn, of frontal setae, non-taeniate L setae, reduced fringe of anal lobe, loss of caudolateral comb or spur on pupal tergite VIII etc. probably are homoplasies rather than signifying synapomorphy and initially are not given additional weight. However, they would be highly significant if signifying uniquely derived synapomorphies and are given high weight in some parsimony tests.
55. Thoracic horn: (0) simple; (1) with 20 or less branches; (2) with more than 20 branches.
- Whenever the thoracic horn is absent this character is scored as '?'.
56. Thoracic horn: (0) with long or short chaetae; (1) with short chaetulae; (2) bare.
- Whenever the thoracic horn is absent or branched this character is scored as '?'.
57. Thorax: (0) smooth; (1) slightly or partially rugulose; (2) strongly and/or extensively rugulose.
– Partial, but strongly rugulose scored as 1&2.
58. Prealar tubercle: (0) weakly developed or absent; (1) strongly developed.
59. Wing sheath: (0) with nose; (1) without nose.
60. Pedes spurii B: (0) present; (1) absent.
61. Pedes spurii A: (0) present; (1) absent.
62. Tergite II: (0) without patches or band of spines (excluding shagreen); (1) with paired, sometimes nearly fused patches of spinules or with anterior band.
63. Tergite II: (0) without posterior spine or spinule patches; (1) with.

64. Tergites III(IV)-V(VI): (0) without anterior paired, sometimes nearly fused patches of spinules; (1) with.
65. Tergites III-V(VI): (0) without anterior band or single patch of spinules or small spines; (1) with.

– Characters 64 and 65 are regarded as separate characters as the bands, when present are at the anterior margin with no shagreen more anterior, while the patches mostly are formed by stronger spinules in two longitudinal bands of shagreen.

66. Tergites: (0) without conspicuously long spines; (1) with.
67. Tergite VII: (0) without patches of spines;(1) at least some species with paired, sometimes nearly fused anterior patches of spines or with anterior band.
68. Conjunctives: (0) bare or at most pair of lateral spinule patches on IV/V; (1) III/IV and/or IV/V with band of spinules.
69. Taeniate L setae: (0) on IV-VIII or V-VIII; (1) on VI-VIII, VII and VIII or VIII only; (2) absent.
70. Segment VIII: (0) with caudolateral comb; (1) with 2-6 strong, thorn-like spines along lateral margin; (2) with single, double or compound spur; (3) bare caudolaterally.
71. Dorsal setae of anal lobe: (0) 2; (1) 1; (2) absent.
72. Number of taeniae in anal lobe fringe: (0) more than 16; (1) 10-16; (2) 3-9; (3) absent.

**Larvae**

73. Antenna: (0) with five segments; (1) with six segments.
74. Antennal pedestal: (0) without apical or apicomesal spur or process; (1) with moderate prominent apical or mesal spur(s), without palmate process; (2) with very prominent apical spur and/or conspicuous palmate process.

– Character state 2 is limited to the Zavreliina, state 1 to at least some species of *Micropsectra*, *Parapsectra*, *Nimbocera*, *Lithotanytarsus* and *Tanytarsus*. A palmate spur is present only in *Stempellina* which may have an additional prominent spur.

75. Lauterborn organs: (0) small or absent; (1) large.
76. Lauterborn organs: (0) arising distally on segment 2; (1) arising alternate in proximal ½ of segment 2 and apically on same segment, or on apices of second and third antennal segments.

- Within Tanytarsini only *Zavrelia* Kieffer and *Stempellinella* Brundin show character state 1. The character is regarded as highly significant. Absence scored as '?'.

77. Lauterborn organs: (0) sessile or absent; (1) on distinct but short pedicels shorter than segments 3-5 combined.; (2) on long pedicels.
78. Antennal seta: (0) absent; (1) present.
79. Clypeal (S3) seta: (0) simple; (1) sometimes bifid; (2) some times toothed or plumose.
80. Bases of S I: (0) not fused; (1) fused.
81. S II: (0) not situated on long pedestal; (1) situated on long pedestal.
82. Pecten epipharyngis: (0) consisting of 3-5 separate, single scales or spines; (1) 3 separate or fused toothed scales or spines.
83. Premandible: (0) with 1-2 apical teeth; (1) with 3-5 apical teeth.
84. Outer margin of mandible: (0) without pronounced hump; (1) with.
85. Dorsal tooth of mandible: (0) present; (1) absent.
86. Pecten mandibularis: (0) present; (1) absent.
87. Apical tooth of mandible: (0) normal; (1) elongate.
88. Seta interna: (0) present; (1) absent.
89. Mola: (0) without serrations or spines on inner margin; (1) with.
90. Mentum: (0) with single, at most trifid median tooth or median tooth with two notches to each side; (1) with two or more median teeth.
91. Mentum: (0) with 9 teeth or if a 5th lateral tooth present this one minute; (1) with 11 teeth; (2) with 12-13 teeth; (3) with 14 or more teeth.
92. Mentum: (0) not medially cleft; (1) medially cleft.
93. Median teeth of mentum: (0) at least as large as lateral teeth; (1) smaller than lateral teeth.
94. Mentum: (0) median tooth largest with lateral teeth gradually smaller; (1) first pair of lateral teeth smaller than second pair; (2) second pair of lateral teeth smaller than first and third pair.
95. Ventromental plates: (0) less than 2.5 times as wide as long; (1) 2.5-3.5; (2) more than 3.5 times.
96. Ventromental plates: (0) approximately triangular; (1) approximately parallel-sided.
97. Ventromental plates: (0) broadly separated by at least the width of 3 median mental teeth; (1) almost in contact, separated by less than width of median mental tooth.

- The shape of the ventromental plates has been regarded as the most important character separating the subtribe Zavreliina from the subtribe Tanytarsina. According to this character *Pontomyia*, *Corynocera* and *Sublettea* all with variable placement should belong to the Tanytarsina.

98. Median apex of ventromental plates: (0) not upturned; (1) upturned and attached to outside margin of median teeth.
99. Seta submenti: (0) situated between ventromental plates; (1) situated below most posterolateral extensions of ventromental plates.
100. Lateral abdominal setae: (0) all simple: (1) one bifurcate.
101. Body segment 11: (0) without dorsal hump; (0) with.
102. Procercus: (0) normal with undivided anal setae; (1) partly sclerotized, with strong anal and lateral setae, some anal setae split or plumose, sometimes with spines.
103. Claws of posterior parapods: (0) all simple; (1) some serrated.
104. Number of claws of posterior parapods: (0) 25 or fewer; (1) more than 25.

Table 3. Character states for characters 1-105 in some genera of Chironominae. Polymorphies: A=0&1, B=0&1&2, C=1&2, D=1&2&3, E=0&2, F=2&3, G=0&1&2&3.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Caladomyia* | 0 | D | 0 | 0 | 0 | 0 | 0 | 1 | A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | A | 0 | 0 | 0 | 0 | A | A | 1 | 2 | A | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 1 |
| *Camposimyia* | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Cladotanytarsus* | A | D | 0 | 1 | A | 0 | 0 | 1 | 0 | A | A | 1 | ? | 1 | 0 | 0 | 1 | 0 | A | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | E | 0 | 1 | 0 | 0 | 0 | 0 |
| *Conochironomus* | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | A | 1 | A | 0 |
| *Constempellina* | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | A | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | ? | ? | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| *Corynocera* | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | ? | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | A | A | 0 | 0 | 0 | 0 |
| *Fissimentum* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| *Friederia* | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| *Imparipecten* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| *Krenopsectra* | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | ? | 0 | 0 | ? | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | ? | ? | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 0 |
| *Lauterborniella* | 0 | C | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | ? | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| *Lithotanytarsus* | 1 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | ? | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Micropsectra* | 0 | D | 0 | 0 | A | 0 | 0 | 1 | 0 | 0 | 0 | 0 | A | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | E | 2 | A | 0 | A | A | 0 | A |
| *Microtendipes* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | A | 0 | 1 | ? | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | C | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Nandeva* | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | ? | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| *Neostempellina* | 1 | 2 | A | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | A | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | ? | ? | 1 | 1 | 0 | 0 | 2 | C | A | 0 | 1 | 1 | 0 | 0 |
| *Neozavrelia* | 1 | D | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | A | A | 1 | 1 | 0 | 0 | 1 | 1 | A | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| *Nidnurbia* | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | ? | 0 | 0 | ? | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ? | ? | 1 | 1 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Nilodosis* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | A | 0 | A | 0 |
| *Nilothauma* | 0 | 3 | A | 0 | 1 | 0 | 0 | 0 | 0 | A | 1 | ? | C | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | A | A | 1 | 0 | A | 0 | 1 | 0 | 0 | A | A | 0 |
| *Nimbocera* | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| *Paralauterborniella* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| *Parapsectra* | A | F | 0 | A | A | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | A | 1 | ? | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 |
| *Paratanytarsus* | 0 | B | 0 | 0 | 0 | 0 | A | 1 | 0 | 0 | 0 | 0 | A | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | A | 0 | 1 |
| *Paratendipes* | 0 | B | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | ? | A | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | A | C | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| *Polypedilum* | 0 | B | 0 | 0 | A | 0 | A | 0 | 0 | 0 | A | A | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | B | A | B | 0 | A | 0 | 1 | 0 | A | 0 |
| *Pontomyia* | 0 | 3 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | ? | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | ? | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| *Pseudochironomus* | 0 | A | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| *Rheotanytarsus* | A | D | 0 | 0 | 0 | 0 | 0 | 1 | 0 | A | 0 | 0 | C | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | A | 0 | 2 | 2 | 0 | 0 | A | A | 0 | 0 |
| *Seppia* | 1 | 3 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 1 |
| *Skutzia* | 1 | F | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | ? | 1 | 1 | 1 | 0 | 0 | 0 | 2 | A | 0 | 1 | ? | 1 | 0 |
| *Stempellina* | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | A | 1 | 1 | 0 | 0 |
| *Stempellinella* | 1 | D | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 0 |
| *Stenochironomus* | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *Stictochironomus* | 0 | A | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | C | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| *Sublettea* | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | ? | 0 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 1 |
| *Tanytarsus* | 0 | B | 0 | 0 | A | 0 | A | 1 | A | A | 0 | A | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | A | 1 | C | A | E | B | 0 | A | A | A | 0 | A |
| *Thienemanniola* | 1 | 3 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | ? | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | ? | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Virgatanytarsus* | 0 | C | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | A | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 1 | 0 | 0 |
| *Yuasaiella* | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | ? | ? | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| *Zavrelia* | 1 | C | 1 | 1 | 0 | 0 | 0 | 1 | A | 1 | 0 | A | A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 0 |

Table 3 (continued).

| | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Caladomyia* | 0 | 0 | 0 | 0 | A | A | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | A | 0 | 0 | 0 | 0 | 2 | 1 | ? | 0 | 0 | ? | A | 0 | A | 0 | 0 | 0 | 0 | A | 0 |
| *Camposimyia* | 0 | 0 | 0 | 0 | 1 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | 0 | 0 | ? | ? | 0 | 0 | 1 | ? | ? | 0 | 0 | ? | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| *Cladotanytarsus* | 0 | 0 | 1 | 1 | 1 | 1 | A | 1 | 0 | 1 | 0 | 1 | 0 | 0 | A | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Conochironomus* | A | 0 | 0 | B | A | 1 | 0 | 1 | 1 | ? | 0 | 0 | 1 | 0 | 0 | A | 0 | 0 | 0 | 1 | ? | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Constempellina* | 1 | 0 | 0 | 0 | 0 | 0 | 1 | ? | ? | ? | ? | ? | ? | ? | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | A | 1 |
| *Corynocera* | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| *Fissimentum* | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | ? | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Friederia* | 0 | 0 | 0 | 2 | 1 | 1 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Imparipecten* | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | ? | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | ? | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| *Krenopsectra* | 1 | 0 | 0 | 1 | 0 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | A | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| *Lauterborniella* | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | ? | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | ? | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | A | 0 | 0 | 2 |
| *Lithotanytarsus* | 0 | 0 | 0 | 1 | 1 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 |
| *Micropsectra* | A | A | A | A | A | 0 | 0 | 1 | 1 | ? | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Microtendipes* | 0 | 0 | 0 | E | A | 1 | A | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 0 | 1 | ? | A | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | A | 1 | 0 | 0 |
| *Nandeva* | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | ? | 0 | ? | 0 | 0 | 0 | 1 | 0 | 2 | 1 | ? | ? | 0 | 0 | 1 | 1 | 1 | 1 | A | 1 | 0 | 0 | A | 1 | 2 | 3 |
| *Neostempellina* | 0 | 0 | 0 | 0 | 0 | 1 | ? | ? | ? | ? | ? | ? | ? | ? | 1 | 1 | 1 | 1 | 0 | 0 | 0 | A | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Neozavrelia* | 0 | 0 | 0 | 0 | 1 | ? | ? | ? | ? | ? | ? | ? | ? | ? | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| *Nidnurbia* | 0 | 0 | 0 | 0 | 1 | 1 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Nilodosis* | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | ? | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Nilothauma* | 0 | 0 | 0 | E | 0 | 1 | 0 | 1 | 1 | ? | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | ? | 1 | A | 1 | A | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | E |
| *Nimbocera* | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | A | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| *Paralauterborniella* | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | ? | 1 | 0 | 1 | 0 | 0 | A | 0 | 0 | 0 | 1 | ? | 1 | 0 | 1 | 0 | 0 | A | 0 | 0 | 0 | 0 | 0 | 1 | 0 | B |
| *Parapsectra* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | ? | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | E | 1 | 0 | A | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 |
| *Paratanytarsus* | 0 | 1 | 0 | A | 0 | 0 | 0 | 1 | 1 | ? | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | A | A | 1 | 0 | A | 1 | 0 | 0 | A | 0 | A | 0 | 0 | 0 | 0 |
| *Paratendipes* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | A | A | A | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Polypedilum* | 0 | 0 | 0 | 2 | 0 | A | 1 | 0 | 1 | ? | 1 | 0 | 1 | A | A | 0 | A | A | 0 | C | ? | A | A | 1 | A | A | A | A | 0 | 0 | A | 0 | A | 1 | A | E |
| *Pontomyia* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 2 | 1 | ? | ? | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 |
| *Pseudochironomus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | A | 2 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| *Rheotanytarsus* | 1 | 0 | 0 | A | A | 0 | 0 | 1 | 1 | ? | 0 | 1 | 0 | 1 | A | 0 | 0 | A | 0 | 0 | C | A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | A |
| *Seppia* | 0 | 0 | 0 | 0 | 1 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Skutzia* | 0 | 0 | 0 | A | 1 | 1 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Stempellina* | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | A | 0 | 0 | A | 2 | 1 | 0 | 0 | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | A |
| *Stempellinella* | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| *Stenochironomus* | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | ? | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 2 | ? | 1 | 0 | 1 | 1 | 1 | A | 0 | 1 | 0 | 0 | 0 | A | 0 | 0 |
| *Stictochironomus* | 0 | 0 | 0 | 2 | 1 | A | 0 | 0 | 1 | ? | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | 2 | ? | 0 | A | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Sublettea* | 1 | 0 | 0 | 0 | 0 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 3 |
| *Tanytarsus* | A | 0 | 0 | B | A | 0 | A | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | A | 0 | A | 0 | 0 | B | B | A | A | 0 | A | A | 0 | 0 | 0 | A | 0 | 0 | B | 0 |
| *Thienemanniola* | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | ? | ? | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| *Virgatanytarsus* | 0 | 0 | 0 | 1 | 0 | 0 | ? | ? | 0 | 1 | 0 | ? | ? | ? | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | A | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| *Yuasaiella* | 0 | 0 | 0 | 1 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Zavrelia* | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |

Table 3(continued).

| | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Caladomyia* | 0 | A0 | | 1 | 0 | 2 | 1 | 1 | E | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | ? | 0 | 0 | 1 | 0 |
| *Camposimyia* | 1 | 0 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Cladotanytarsus* | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| *Conochironomus* | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Constempellina* | 2 | 1 | 0 | 2 | 0 | 1 | 1 | 1 | E | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | ? | 0 | 1 | 0 | 0 |
| *Corynocera* | 0 | A | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | ? | 0 | 0 | 0 | 0 |
| *Fissimentum* | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 4 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Friederia* | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Imparipecten* | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Krenopsectra* | C | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | ? | 1 | 0 | 0 | 0 |
| *Lauterborniella* | 2 | A | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *Lithotanytarsus* | 2 | 3 | 0 | 1 | 0 | 0 | 1 | 1 | ? | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| *Micropsectra* | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | A | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | A |
| *Microtendipes* | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 3 | 0 | A | C | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nandeva* | C | 3 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Neostempellina* | 2 | 0 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ? | 0 | 1 | 0 | 0 |
| *Neozavrelia* | 0 | F | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | ? | 0 | 0 | 0 | 0 |
| *Nidnurbia* | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Nilodosis* | 2 | 0 | 1 | 0 | ? | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 4 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nilothauma* | 1 | 0 | 1 | 0 | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Nimbocera* | 0 | A | 0 | 1 | 0 | 2 | 0 | 1 | A | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | ? | 0 | 0 | 0 | 0 |
| *Paralauterborniella* | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Parapsectra* | 1 | 0 | 0 | 0 | 0 | 2 | 0 | A | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | ? | 0 | 0 | ? | 0 |
| *Paratanytarsus* | 1 | B | 0 | 0 | 0 | A | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Paratendipes* | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 1 | E | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Polypedilum* | C | A | A | 0 | A | 0 | A | 0 | 0 | 0 | 0 | A | A | 0 | A | 1 | 0 | 0 | A | 1 | 4 | 0 | 0 | A | B | A | 0 | A | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pontomyia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| *Pseudochironomus* | 1 | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Rheotanytarsus* | C | G | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Seppia* | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Skutzia* | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Stempellina* | 2 | 0 | 0 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ? | 0 | 1 | 0 | 0 |
| *Stempellinella* | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ? | 0 | 0 | 0 | 0 |
| *Stenochironomus* | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Stictochironomus* | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sublettea* | 2 | 2 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| *Tanytarsus* | 0 | A | 0 | 1 | 0 | 2 | 0 | 1 | E | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | A | 0 |
| *Thienemanniola* | 2 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| *Virgatanytarsus* | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| *Yuasaiella* | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| *Zavrelia* | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | ? | 0 | 0 | 0 | 0 |