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Paratrichocladius nivalis (Goetgh.) described with observations on the taxonomic status of the species (Diptera Chironomidae)

Abstract - *Paratrichocladius nivalis* (Goetgh.) was considered a junior synonym of *P. skirwithensis* (Edw.). The species is described from the lectotype and it is established as a valid species. The closely related species are described, the hypopygia are figured and a key to species belonging to the *nivalis* group is given.

Riassunto - Paratrichocladius nivalis *(Goetgh.) descritta con osservazioni sullo stato tassonomico della specie (Diptera Chironomidae).*

Paratrichocladius nivalis (Goetgh.) era finora considerato sinonimo di *P. skirwithensis* (Edw.). La specie viene ora descritta dal lectotipo ed è stabilita come specie valida. Vengono descritte le specie affini appartenenti al gruppo *nivalis* e ne sono disegnati gli apparati genitali maschili. È anche fornita una chiave dicotomica per le specie del gruppo.

Key words: *Paratrichocladius nivalis, P. skirwithensis*, Chironomidae.

INTRODUCTION

Hirnenoja (1973) established that *Trichocladius nivalis* (Goetghebuer, 1938) was a junior synonym of *Paratrichocladius skirwithensis* (Edw., 1929). Cranston (1982) showed that the synonymy of the 2 species was incorrect after the examination of the immature stages of both species. Cranston (1982) observed that the larva of *P. nivalis* (Goetgh.) has a bifid premandible, whereas the larva of *P. skirwithensis* (Edw.) has a simple premandible. This observation about larval morphology was never followed by a redescription of the adult males.

Rossaro (1990) described 4 new species of the genus from Italy and emphasized that *P. guidalii* Ross. has some features in comon with *P. nivalis*

(Goetgh.), but type material od *P. nivalis* was not available and had not been examined.

In this paper the lectotype of *P. nivalis* (Goetgh.) is described in detail and the species is definitely established as a valid species. The related species are also described. Methods and terminology follow Saether (1969, 1980).

DESCRIPTION OF THE SPECIES

The generic description of the larva is in Cranston et al. (1983), the pupal exuvia is described by Cranston et al. (1986), Cranston et al. (1989) gives the generic description of the adult male.

Paratrichocladius skirwithensis (Edwards, 1929)

Paratrichocladius skirwithensis (Edwards, 1929): 329, sub *Spaniotoma* Subg. *Trichocladius*: adult male, Skirwith., Cumberland, England 6.VII.1927. Type material is in British Museum, Natural History.

ADULT MALE. Described from holotype and from material collected in Italian Alps.

Thorax mainly black, but pronotum, shoulders and a large pleural patch yellowish, vittae (scutal stripes) black, distinct from the yellow ground color.
Head. Eye hairy, with short dorsomedial extension. Temporal setae uniserial; 4 inner verticals. Cornua of cibarial pump pointed. Clypeus with about 10 setae.
Antenna. With 13 flagellomeres and well developed plume; groove beginning about flagellomere 4; sensilla chaetica on flagellomeres 2-3 and 13; apex narrowed and pointed. Antennal ratio 1.00-1.05.
Thorax. Antepronotal lobes separated medially. Humeral pits absent. About 7 acrostichals beginning near antepronotum; about 10 dorsocentrals uniserial, arising from a white spot; 7 prealars; 10 scutellars.
Legs. Pseudospurs absent. About 12-15 sensilla chaetica present on tarsomere 1 of hind leg (Ta_1P_{III}). Pulvilli vestigial.
Abdomen. Tergites sparsely setose, with setae irregularily arranged.
Hypopygium. (figg. 12, 13, see also Pinder, 1978).

Anal point absent. Sternapodeme convex, with distinct oral projection. Virga absent. Gonocoxite with triangular inferior volsella, with convex median margin and a concave posterior margin. Inferior volsella covered with short setae and microtrichia (figg. 12, 13). Superior volsella indistinct.

Gonostylus with a small triangular crista dorsalis, bearing about 6 setae.

Material examined from Italy: 10.IX.1985 Viola stream, Valtellina, Lombardia (Sondrio) (14.VIII.1978), val Genova, Trentino.

Paratrichocladius nivalis (Goetgh.)

Paratrichocladius nivalis Goetghebuer, 1938: 61-62, sub *Trichocladius*, adult male and female, Park National Suisse, 3.IV.1937, Nadig leg. Type material: 3 adult males and 1 female in Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Loan *N*°: Ent. 90/156. One adult male designated by Hirvenoja (1973) as lectotype.

ADULT MALE. Description from lectotype and paralectotypes.

Medium sized species, wing length 2.8 mm.

Head. Eye hairy, without dorsomedial extension. Temporal setae uniserial; 2 inner verticals. Cornua of cibarial pump pointed. Clypeus with 6 setae.

Antenna. With 13 flagellomeres and well developed plume; groove beginning about flagellomere 3; sensilla chaetica on flagellomeres 2-3 and 13; apex enlarged and rounded. Antennal ratio 0.8-0.95.

Thorax. Antepronotal lobes separated medially. Humeral pits absent. About 7-10 acrostichals beginning near antepronotum; about 12-17 dorsocentrals uniserial, arising from a white spot; 3-4 prealars; more than 20 scutellars in 2 rows. Vittae and ground color dark.

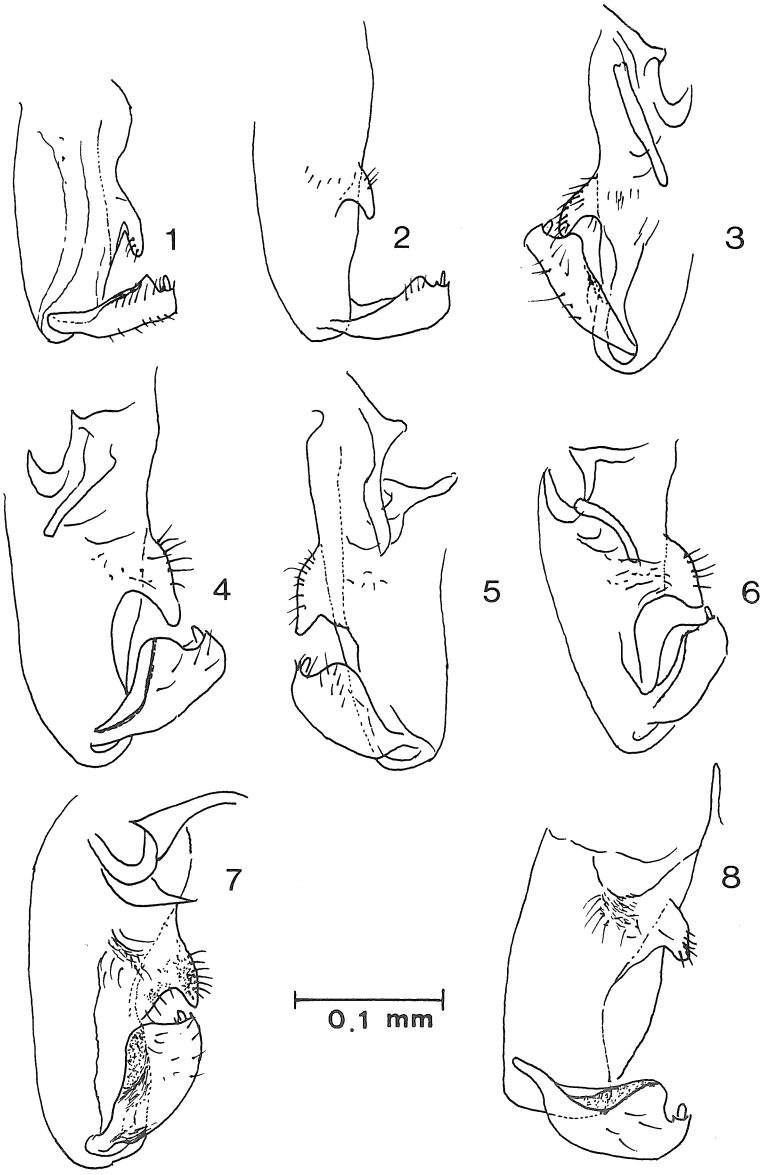
Wing. In bad condition both in lecto- and paralectotypes. Membrane without setae, with moderate punctation. Costa not extended. R_{2+3} ending near R_1. R_{4+5} ending distal to end of M_{3+4}; Cu_1 curved. Squama with about 10 setae.

Legs. Pseudospurs absent. Two sensilla chaetica present on tarsomere 1 of hind leg (Ta_1P_{III}). Eight sensilla in the specimen from Aosta valley, 13 in the specimen from Chiareggio. Pulvilli vestigial.

Abdomen. Tergites sparsely setose, with setae irregularily arranged.

Hypopygium. (figg. 4-8). Anal point absent. Sternapodeme convex, with distinct oral projection. Virga absent. Gonocoxite with stout, finger-like inferior volsella. Inferior volsella with apex abruptly curved posteriorly. Median margin moderately convex, posterior margin deeply concave. Superior volsella indistinct, rounded. Gonostylus with a very developed rounded crista dorsalis, bearing about 6 setae.

Distribution: Holarctic (Cranston & Oliver, 1988). Collecting sites in Italy (Rossaro leg. if not otherwise stated): 10.VI, 3.VII, 14.XI.1978, 18.II, 19.V.1979 S. Apollonia spring 1500 m o.s.l. on the road to Gavia pass Lombardia (Brescia), 22.VI.1983 Chiareggio, Valtellina, Lombardy, 23.VI.1987 Lys glacier stream Aosta Valley, Gressoney (Aosta).



Figs. 1-8 - Hypopygium of the species described: *Paratrichocladius guidalii* olotype (fig. 1); *P. guidalii* paratype, spring in Bighera valley, 20.8.1981 (fig. 2); *P. guidalii* paratype, Oglio river near Vezza, 25.3.1978 (fig. 3); *P. nivalis*, Lys glacier stream, Aosta valley, 23.6.1987 (fig. 4); *P. nivalis*, Lys glacier stream, Aosta valley, 23.6.1987 (fig. 4); *P. nivalis*, springer near Chiareggio (Sondrio), 22.6.1983 (fig. 5); *P. nivalis*, spring near S. Apollonia, 10.6.1978 (fig. 6); *P. nivalis*, lectotype (fig. 7); *P. nivalis*, paralectotype (fig. 8).

Paratrichocladius guidalii Rossaro, 1990

ADULT MALE. Description from type material.

Vittae black, only moderately darker than thorax-ground color. Wing 3 mm long.

Head. Eye hairy, with moderate dorsomedial extension. Temporal setae uniserial; 3 inner verticals present. Cornua of cibarial pump pointed. Clypeus with 20 setae.

Antenna. With 13 flagellomeres and well developed plume; groove beginning about flagellomere 4; sensilla chaetica on flagellomeres 2-3 and 13; apex pointed at apex. Antennal ratio greather than 1, about 1.25 (1.20-1.30).

Thorax. Antepronotal lobes separated medially. Humeral pits absent. About 7 acrostichals beginning near antepronotum; about 17 dorsocentrals uniserial, arising from a white spot; 3 prealars; more than 20 scutellar multiserial. Vittae and ground color dark.

Legs. Pseudospurs absent, 4-5 sensilla chaetica present on tarsomere 1 of hind leg (Ta_1P_{III}). Pulvilli vestigial.

Wing. In bad condition both in lecto- and paralectotypes. Membrane without setae, with moderate punctation. Costa not extended. R_{2+3} ending near R_1. R_{4+5} ending distal to end of M_{3+4}; Cu_1 curved. R_1 without setae, R_{4+5} with 0-2 setae. Squama with about 10-15 setae.

Abdomen. Tergites sparsely setose, setae numerous, irregularily arranged.

Hypopygium. (figg. 1-3). Anal point absent. Sternapodeme convex, with distinct oral projection. Virga apparently absent. Gonocoxite with very slender, finger-like inferior volsella (figg. 1-3). Superior volsella indistinct, rounded.

Gonostylus with a small, pointed and triangular crista dorsalis.

PUPA. Description based on reared material collected in the Oglio river near Vezza (Brescia). Medium sized pupa, 5 mm long.

Cephalothorax. Frontal seta absent. Frontal apotome rugulose. Ocular field with 2 postorbitals and no verticals.

Thorax with 2 median and 1 lateral antepronotals. Thoracic horn present, very small. Three precorneals present. Dorsum of thorax rugulose. Wing sheath without pearls.

Abdomen. Tergite I without shagreen; II-VIII covered with shagreen; IX with anterior band of shagreen. Sternites I and IX without shagreen; II-VIII with weak shagreen. Conjuncitves II/III–III/IV–IV/V–V/VI with trasverse rows of hooklets; there are 2 rows of stout hooklets on II/III and III/IV, 3-4 rows of slender hooklets on IV/V–V/VI. Small anteriorly directed spines are present also on conjunctives. Pedes spurii A and pedes spurii B absent. Apophyses absent.

Anal lobe with 3 anal macrosetae, and without fringe or apical spines. Male genital sac extending beyond anal lobe.

LARVA. Medium sized larva, about 7 mm long. Head capsule black, ocular field yellow.
Antenna. Antenna with 5 segments; segments consecutively smaller. Antennal Ratio 1.0 – 1.2. Ring organ on basal 1/3 of segment 1. Blade ending about level of segment 3 – 4. Accessory blade longer than segment 2. Lauterborn organs large, as long as segment 3. Style slightly longer than segment 3.
Labrum. S_I bifid and feathered along its margin. Remaining S setae simple. Labral lamellae absent. Chaetae simple to serrate; spinulae simple. Pecten epipharyngis consisting of 3 scales; lateral pair longer than middle scale. Chaetulae laterales simple; chaetulae basales with branched tips. Ungula V shaped with small quadrate basal sclerite. Premandible bifid; brush absent.
Mandible. Apical tooth shorter than combined width of 3 inner teeth, scarcely longer than first inner tooth and usually narrower. Outer margin smooth or with faint indication of crenulations near base. Seta subdentalis pointed. Seta interna with 7 simple to weakly serrate branches.
Mentum. With 1 median and 6 pairs of lateral teeth; first lateral tooth broader in middle than at base. Ventromental plate triangular; bear absent.
Body. Anterior and posterior parapods separate, each with an apical crown of claws. Procerci usually shorter than wide with 6-7 anal setae. Body setae simple.

Type material: holotype 1 male, slide mounted in Canada Balsam, 28.IV.1978 Noce river near Stavel (Trento) Rossaro leg. 5 paratypes: 25.III.1978 Oglio river Vezza (Brescia) Rossaro leg, 18.IV.1978 Noce river Adamello group Stavel (Trento) Rossaro leg, in Department of Environmental Sciences, Univ. of L'Aquila, Italy. Specimen collected in Lys glacier stream (Aosta) was previously assigned to this species (Rossaro, 1990), it is assigned to *P. nivalis* in the present paper.

Paratrichocladius osellai Rossaro, 1990

ADULT MALE. Description from type material.
Head. Eye hairy, with moderate dorsomedial extension. Temporal setae uniserial; 4 inner verticals present. Cornua of cibarial pump pointed. Clypeus with 14 setae.
Antenna. With 13 flagellomeres and well developed plume; groove beginning about flagellomere 4-5; sensilla chaetica on flagellomeres 2-3 and 13; apex pointed at apex. Antennal ratio about 1.8 (1.6-2.1).

Thorax. Antepronotal lobes separated medially. Humeral pits absent. About 7 acrostichals beginning near antepronotum; about 8-12 dorsocentrals uniserial, arising from a white spot; 4 prealars; 12 scutellar in 2 rows. Vittae and ground color dark.
Legs. Pseudospurs absent, 0-2 sensilla chaetica present on tarsomere 1 of hind leg (Ta_1P_{III}). Pulvilli vestigial.
Abdomen. Tergites sparsely setose, setae numerous, irregularily arranged.
Hypopygium. (figg. 9-11). Anal point absent. Sternapodeme convex, with distinct oral projection. Virga apparently absent. Gonocoxite with small, triangular inferior volsella (figg. 9-11). Superior volsella indistinct, rounded. Gonostylus with a very reduced crista dorsalis.

PUPA. Description based on reared material collected in the type locality.

Medium sized pupa, 5 mm long.
Cephalothorax. Frontal seta absent. Frontal apotome rugulose. Ocular field with 2 postorbitals and no verticals.
Thorax with 2 median antepronotals. Thoracic horn present, very small. Three precorneals present. Dorsum of thorax smooth. Wing sheath without pearls.
Abdomen. Tergite I without shagreen; II-VIII covered with shagreen; IX with anterior band of shagreen. Sternites I and IX without shagreen; II-VIII with weak shagreen. Conjunctives II/III–III/IV with trasverse rows of hooklets; there are 2 rows of stout hooklets on II/III, 4-5 rows of very slender hooklets on III/IV. Four rows of small anteriorly directed spines or hooklets are present on conjunctives IV/V–V/VI. Pedes spurii A and pedes spurii B absent. Apophyses absent.

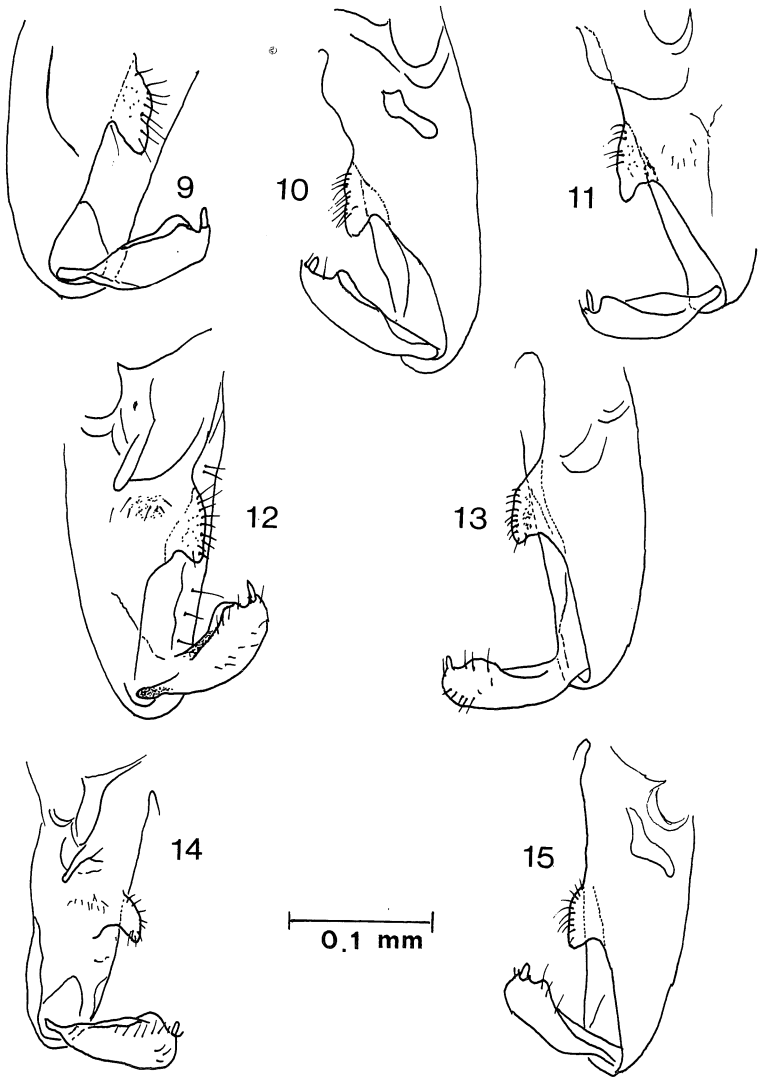
Anal lobe with 3 anal macrosetae, and without fringe or apical spines. Male genital sac extending beyond anal lobe.

Type material: holotype 1 male, slide in Canada Balsam 4.III.1978 Oglio river loc. Vezza (Brescia) Rossaro leg, 26.IX.1985 Dora Veny (Aosta) Rossaro leg, 4.III.1978 Oglio river loc. Vezza (Brescia) Rossaro leg. The species is found only in waters fed by glaciers.

Paratrichocladius veronicae Rossaro, 1991

ADULT MALE. Description from type material.

The adult male cannot be separated from *P. skirwithensis* Edw. Body colour light with brown vittae.
Antenna. Antennal ratio 1.0-1.2.
Thorax. Ten dorsocentrals, 8 acrostichals. About 16 sensilla chaetica on Ta_1P_{III}.



Figs. 9-15 - Hypopygium of the species described: *Paratrichocladius osellai*, olotype (fig. 9); *P. osellai*, paratype, Spring above S. Apollonia, 28.8.1981 (fig. 10); *P. osellai*, val Veny, Aosta valley, 26.9.1985 (fig. 11); *P. skirwithensis* Genova valley, Adamello-Brenta group, Trentino, 14.8.1978 (fig. 12); *P. skirwithensis* Viola valley, Valtellina, Lombardy, 10.9.1985 (fig. 13); *P. guidalii?* Aso stream, Marche, 10.4.1981 (fig. 14); *P. veronicae* Vera spring, L'Aquila, Abruzzo, 29.12.1989 (fig. 15).

Hypopygium. (fig. 15). It is quite similar to the hypogygium of *P. skirwithensis* (Edw.).

PUPA. Description from a pupal exuvia from a reared larva.

Medium sized pupa, 5 mm long.

Cephalothorax. Frontal seta absent. Frontal apotome rugulose. Ocular field with 2 postorbitals and no verticals.

Thorax with 2 median antepronotals. Thoracic horn present, very small. Three precorneals present. Dorsum of thorax smooth. Wing sheath without pearls.

Abdomen. Tergite I without shagreen; II-VIII covered with shagreen; IX with anterior band of shagreen. Sternites I and IX without shagreen; II-VIII with weak shagreen. Shagreen similar over all the surface of tergites, posterior field with spinules only moderately stronger than median and anterior field. Conjunctives II/III and III/IV with 3 trasverse rows of hooklets; IV/V–V/VI with 4 transverse rows of slender hooklets. They are very slender on conjunctive V/VI. Pedes spurii A and B absent. Apophyses absent.

Anal lobe with 3 anal macrosetae, and without fringe or apical spines. Male genital sac extending beyond anal lobe.

LARVA. Medium sized larva, about 7 mm long. Head capsule yellow with dark occipital region.

Antenna. Antenna with 5 segments; segments consecutively smaller. Antennal Ratio 1.0 – 1.2. Ring organ on basal 1/3 of segment 1. Blade ending about level of segment 3–4. Accessory blade longer than segment 2. Lauterborn organs large, as long as segment 3. Style slightly longer than segment 3. Mandible and lateral teeth of dorsomentum black.

Labrum. S_I simple and feathered along its margin. Remaining S setae simple. Labral lamellae present as 2 small well separated apically serrated scales. Chaetae simple to serrate; spinulae simple. Pecten epipharyngis consisting of 3 scales; lateral pair longer than middle scale. Chaetulae laterales simple; chaetulae basales with branched tips. Ungula V shaped with small quadrate basal sclerite. Premandible simple; brush absent.

Mandible. Apical tooth shorter than combined width of 3 inner teeth, scarcely longer than first inner tooth and usually narrower. Outer margin smooth or with faint indication of crenulations near base. Seta subdentalis pointed. Seta interna with 7 simple to weakly serrate branches.

Mentum. With 1 median and 6 pairs of lateral teeth; first lateral tooth broader in middle than at base. Ventromental plate triangular; beard absent.

Body. Anterior and posterior parapods separate, each with an apical crown of claws. Procerci usually shorter than wide with 6-7 anal setae. Body setae simple.

Type material: holotype 1 male, slide in Canada Balsam, 29.XII.1989 Vera spring near Tempera (L'Aquila) Prato leg., paratypes in Canada Balsam: 29.VI.1987, 1 reared male with pupal exuvia, 16.I.1988 1 larva, 12.III.1988 1 adult male, 22.III.1988 1 larva, 7.V.1988 5 larvae, 3.V.1989 1 male 2 pupal exuviae, 6.VI.1989 2 males, Rossaro leg., 20.XI.1990 1 reared male, 1 reared female, with associated pupal exuvia and larval exuvia, Pantani leg.

KEY TO SPECIES BELONGING TO THE «*NIVALIS*» GROUP

1. Gonostylus with a very developed, rounded crista dorsalis. Tip of antenna rounded ..... *P. nivalis* Goetgh.
— Crista dorsalis less developed, more or less triangular. Tip of antenna pointed 2
2. Inferior volsella digitiform, antennal ratio greater than 1.0 (about 1.2), chaetiform sensilla present on Ta_1P_{III}.
Pupa with very strong intersegmental spines on T_{III}/T_{IV} and T_{IV}/T_V .... *P. guidalii* Ross.
— Inferior volsella triangular, insersegmental spines of pupa not very strong 3
3. Antennal ratio less or equal 1.0 (0.9 - 1.0), sensilla chaetica very numerous (10 - 15), pronotum, shoulders, and a large pleural patch yellowish, only vittae dark.
Larva with a simple premandible 4
— Antennal ratio much greater than 1.0 (about 1.7-2.0), senislla chaetica absent or less than 2, body color dark, larva with bifid premandible ..... *P. osellai* Ross.
4. Larva with simple feathered setae anteriores S_I ..... *P. veronicae* Ross.
— Larva with bifid feathered setae anteriores S_I ..... *P. skirwithensis* Edw.

TAXONOMICAL REMARKS

According to Cranston & Oliver (1988) there is considerable variation in the shape of the inferior volsellae in the species of the genus *Paratrichocladius*. Rossaro (1990) emphasized that the male genitalia morphology is stable within a species, so a different shape of the male inferior volsella is a character that well separates species.

The examination of type material of *P. nivalis* Goetgh. confirms that it is a valid species (Cranston, 1982).

It is also emphasized that species are present that cannot be separated on the basis of hypopygium morphology, but are easily separated on the basis of larval or pupal characters and sometimes also on the basis of morphometric characters such as antennal ratio and the number of sensilla chaetica. *P. veronicae* Ross. and *P. skirwithensis* Edw. can be separated only on the basis of larval characters (setae anteriores S_I), whereas *P. osellai* Ross. can be separated from

P. skirwithensis (Edw.) on the basis of antennal ratio, the number of sensilla chaetica and the bifid premandible in the larva. *P. guidalii* Ross. and *P. osellai* Ross. can be easily separated on the basis of antennal ratio of adult male and the developments of hooklets on pupal exuviae.

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