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Contribution to the knowledge of *Glyptotendipes pallens* (MEIGEN, 1804) and *Glyptotendipes glaucus* (MEIGEN, 1818)

(Insecta: Diptera: Chironomidae)

P. Michailova* & R. Contreras-Lichtenberg**

Abstract

The karyotype and the morphology of adult males, pupae and larvae of *Glyptotendipes pallens* (MEIGEN, 1804) and *Glyptotendipes glaucus* (MEIGEN, 1818) are described. A lectotype of *G. pallens* and a neotype of *G. glaucus* are designated.

Key words: Chironomidae, *Glyptotendipes*, morphology, karyology, taxonomy, lectotype designation, neotype designation.

Zusammenfassung

Der Karyotypus sowie die Morphologie der männlichen Imagines, Puppen und Larven von *Glyptotendipes pallens* (MEIGEN, 1804) und *Glyptotendipes glaucus* (MEIGEN, 1818) werden beschrieben. Ein Lectotypus von *G. pallens* und ein Neotypus von *G. glaucus* werden designiert.

Introduction

Glyptotendipes pallens was originally described from adult males and females which were probably collected by Meigen near Stolberg or Aachen - "Die meisten beschriebenen Arten habe ich selbst, teils in hiesiger Gegend [Stolberg] teils früher in meinem Vaterlande dem Herzogtume Berg, gesammelt" (MEIGEN, 1804). The collection of the Naturhistorisches Museum Wien (NHMW) contains a male with the following labels: "*pallens* Coll. Winthem", "*pallens*" (original handwriting by Meigen), "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting). This specimen is here designated as lectotype of *G. pallens*. In the Muséum National d'Histoire Naturelle, Paris, in Coll. Meigen under Nr. 131, a female without abdomen is stored (Dr. Matile, pers. comm. to the second author), which is supposed to be a syntype. The specimen has a round label: "Type" and a label "*pallens*" with Meigen's handwriting (Mr. Schillhammer, NHMW, pers. comm.). EDWARDS (1929) when discussing this species probably refers to this specimen.

The type of *Glyptotendipes glaucus* seems to be lost. In Coll. NHMW one male of *G. glaucus* from Kiel ex Coll. Winthem is stored. This specimen is designated as neotype.

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EDWARDS (1929) when redescribing *G. glaucus* MEIGEN states the synonymy of *G. obscuripes* MEIGEN with *Glyptotendipes glaucus*. He refers to type material of *G. obscuripes* which is kept in the Museum of Paris. In the NHMW there are two females and a male belonging to this type series. After having studied these specimens the synonymy of *G. obscuripes* MEIGEN with *Glyptotendipes glaucus* can be confirmed. EDWARDS (1929) states that *G. pallens* is a "*Glyptotendipes* related to the present species, but the type has distinct frontal tubercles, and differs, as stated by MEIGEN, in having pale instead of dark antennae". KRUSEMAN (1933) refers to the description of EDWARDS (1929) confirming the difference between *G. glaucus* and *G. pallens* using the presence or absence of frontal tuberculi as diagnostic character but stating at the same time the high variability of frontal tuberculi in *Glyptotendipes*. This can be confirmed especially in *G. glaucus*. In general, frontal tuberculi are missing in *G. glaucus*. KRUSEMAN (1933) in accordance with EDWARDS (1929) states, that *G. pallens* has distinct frontal tuberculi. He interprets *G. glaucus* to be a variety of *G. pallens*. GOETGHEBUER (in GOETGHEBUER & LENZ 1937) synonymized *G. glaucus* and *G. pallens* and KALUGINA (1963) confirmed this synonymy.

When reviewing the Chironomidae - collection of the NHMW and also specimens from Coll. Franz, which is now included in the Coll. NHMW, Goetghebuer apparently based his identifications only on this character as well. The forelegs of the lectotype of *G. pallens* have tarsi which are bearded. This agrees with the redescription by MEIGEN (1818). The frontal tuberculi are very small. The morphology of the male of this specimen agrees with material of *G. pallens* studied by the authors. The female of Meigen's collection in Paris has also small frontal tuberculi (Mr. Schillhammer, NHMW, pers. comm.).

When studying the karyotype of *G. glaucus*, two different forms could be distinguished (MICHAILOVA, in press). When these forms were reared from egg masses to adults, two distinct karyotypes were present. They belong to two species which are well characterized in all life stages: *Glyptotendipes pallens* and *G. glaucus*.

The present paper deals with the description of karyotypes, larvae, pupae and male adults of *G. pallens* and *G. glaucus*. Karyotypes and immature stages are described by the first author, the male adults are described by the second author. Lectotype and neotype designations are done by the second author.

The morphology of the female genitalia of *G. pallens* and *G. glaucus* is described by CONTRERAS-LICHTENBERG (in press). Females of *G. pallens* and *G. glaucus* are easily to distinguish by the different shape of the postgenital plate: it is distinctly carinate in *G. glaucus* and not carinate in *G. pallens*.

Acknowledgements

Thanks are due to Dr. P. Grootaert (Koninklijk Belgisch Instituut voor Naturwetenschappen, Afdeling Entomologie, Brussels, RIScNB) for providing type material of *Glyptotendipes* for this study. Dr. Loic Matile (Muséum National d'Histoire Naturelle, Paris) was helpful in giving detailed information on the paratype of *G. pallens* in Meigen's collection in Paris. Mr. Schillhammer (NHMW) checked the specimen when staying in Paris. Thanks are also due to M. Herberstein (Zoologisches Institut der Universität Wien) for proof-reading of the English manuscript.

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Karyotypes and morphological characteristics of immature stages

Material and methods

Egg masses were collected from northern Bulgaria (Russe, fish pond, "Mechka"), northeast Bulgaria (Shabla lake) and from a fish pond near Sofia, "Chelopechene". Egg masses from Velencea (Hungary) were also used. These egg masses were reared separately under laboratory conditions using the method described by MICHAILOVA (1985). Some of the egg reared larvae (IVth instar) were used for karyotype analysis and other larvae from the same egg mass were reared to adults. Two different karyotypes were established. In the beginning of this study one karyotype was indicated as the karyotype of the 1st form. The other karyotype was indicated as the karyotype of the 3rd form. An analysis of each karyotype was carried out on 32 individuals each. All slide mounted material is maintained by the first author in the collections of the Bulgarian Academy of Sciences in the Institute of Zoology, Sofia, Bulgaria.

Male adults reared from egg masses belonging to the 1st karyotype form are in very good agreement with the males from the collection of NHMW identified as *G. pallens*.

The material of immature stages of *G. pallens* described for this paper came from Shabla lake, Bulgaria, and Velencea, Hungary.

Male adults reared from egg masses belonging to the 3rd karyotype form have been identified as *G. glaucus* using Meigen's material in the NHMW. The material described for this paper is from "Chelopechene" and "Mechka", Bulgaria. Inter-species hybridization was carried out by the method of MICHAILOVA (1985).

The technique of chromosome preparations followed KEYL & KEYL (1959). The identification of chromosome arms goes back to MICHAILOVA (1979). The terminology of larvae and pupae is according to SÆTHER (1980).

Karyotypes and chromosome polymorphism

Both species have 2n = 8. Ist, IInd, and IIIrd chromosomes are metacentric, IVth is acrocentric, with arm combination: AB, CD, EF, G. Nucleolus only in arm G, with three Balbiani rings in the same arm. Centromeres are slightly heterochromatinized.

Arms A (Figs. 1, 2). The two species show the same band pattern: 1 2 3ab 4 5. Markers of this arm are: the dark bands in sections 1 and 4.

Arms B (Figs. 1, 2). The two species have the same band pattern: 6 7 8 9 10. This arm can be recognized by the constriction in section 5 - 6. The bands in sections 7 8 9 10 are typical. Both species have a heterozygous inversion at the telomere region of this arm.

Arms C (Figs. 3, 4). The pattern of both species is: 1 2ab 3 4ab 5. A homozygous and heterozygous inversion were found in both species. A homozygous inversion in this section leads to C2 (Fig. 5). Larvae with a homozygous inversion have been indicated as IInd form (MICHAILOVA, in press). In both species in this arm, a polymorphous system exists in this section. This is manifested in the transition from one homozygous inversion to another by means of heterozygotization.

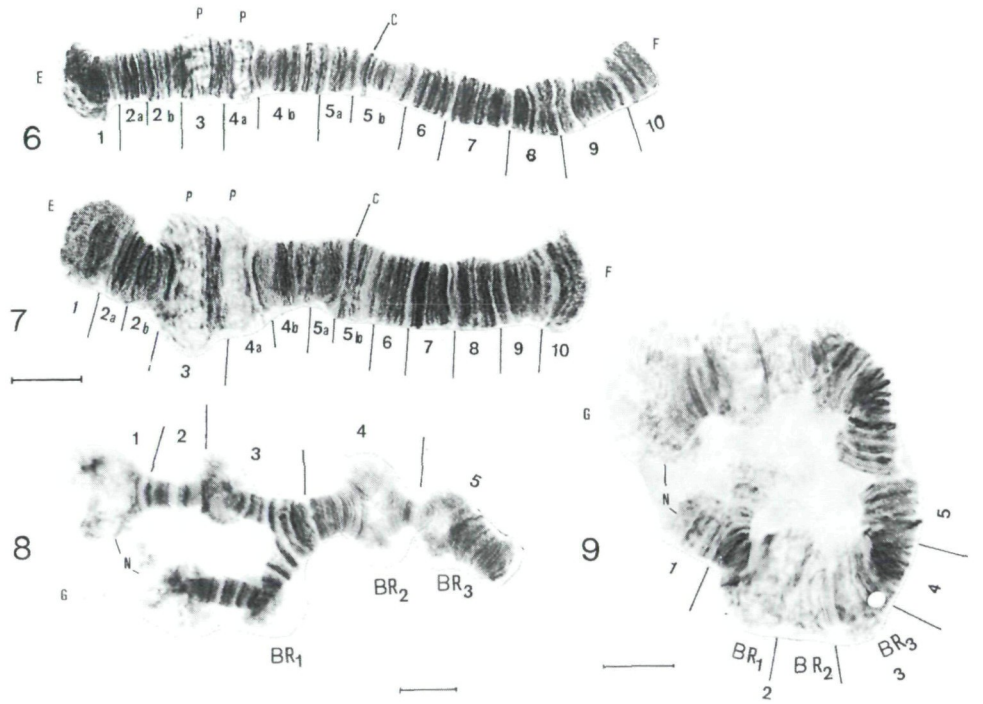
Figs. 1 - 5. Ist chromosome (AB) of (1) *G. pallens*, and (2) *G. glaucus*; IInd chromosome (CD) of (3) *G. pallens* and (4) *G. glaucus*; (5) *G. pallens*, IInd chromosome (CD) with homozygous inversion in arm C (C2); scale = 10 µm.

Arms D (Figs. 3, 4). Both species are distinguished by a constant homozygous inversion in section 7 - 10. *G. pallens*: 6 7 8ab 9abcd 10ab; *G. glaucus*: 6 10a 9dcba 8ba 7 10b.

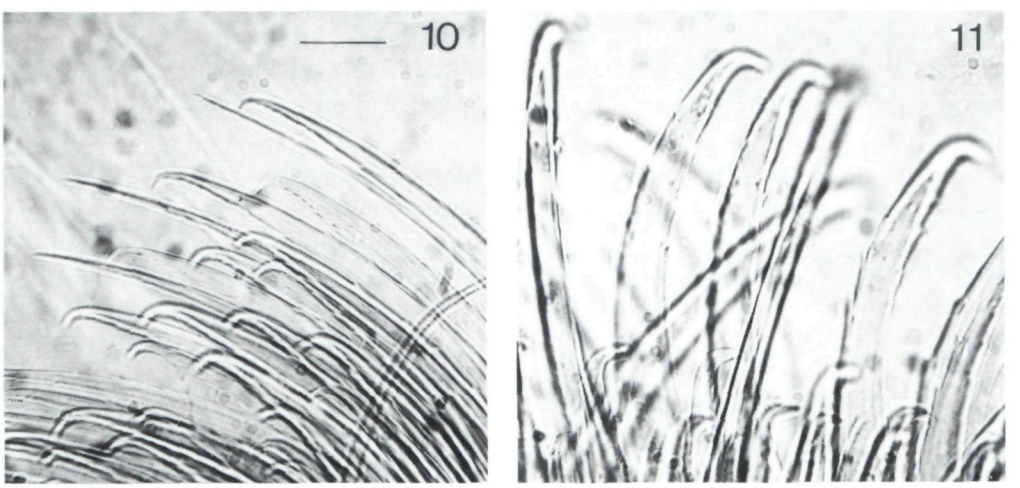
Arms E (Figs. 6, 7). The pattern is identical in both species. 1 2ab 3 4ab 5a. The IVth larval stage of both species has an active region in section 3 - 4a.

Arms F (Figs. 6, 7). Both species show the following band pattern: 5b 6 7 8 9 10.

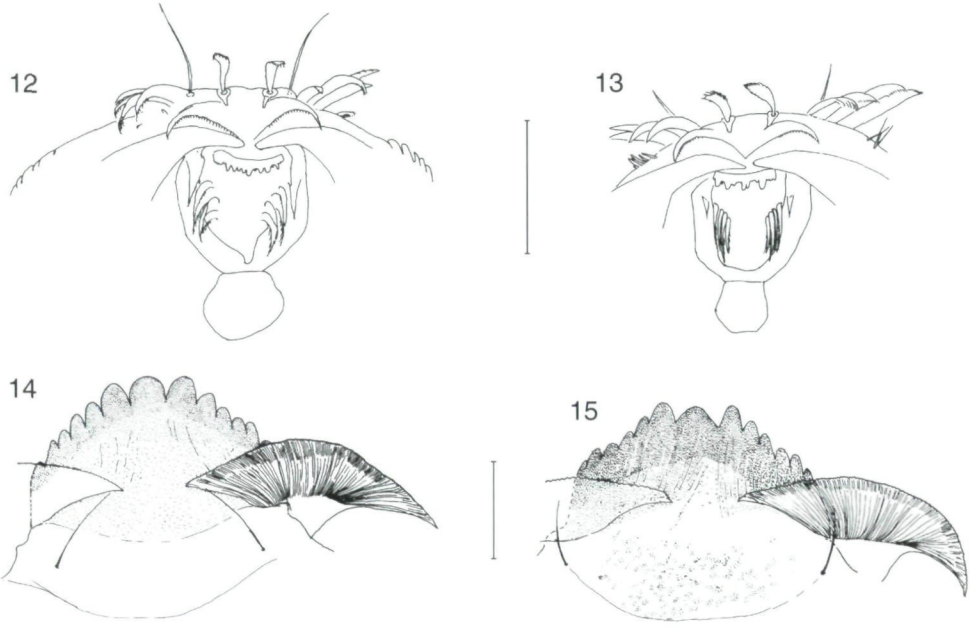
Arms G (Figs. 8, 9). Both species have very different band patterns in this chromosome. They are distinctly distinguished by this arm. In *G. glaucus* the active regions are localized in the middle of this arm, while in *G. pallens* they are distributed along the chromosome. In both species in some cells this arm is partly unpaired, in other cells the homologous are even completely unpaired.



Figs. 6 - 9. IIIrd chromosome (EF) of (6) *G. pallens*, and (7) *G. glaucus*; IVth chromosome (G) of (8) *G. pallens* and (9) *G. glaucus*; N = nucleolus; BR = Balbiani ring; C = centromere; scale = 10 µm.



Figs. 10 - 11. Claws of anterior parapods of larvae of (10) *G. pallens* and (11) *G. glaucus*.



Figs. 12. - 15. Region of the labrum of larvae of (12) *G. pallens* and (13) *G. glaucus*; submentum of larvae of (14) *G. pallens* and (15) *G. glaucus*; scales = 100 µm.

Morphology of immature stages

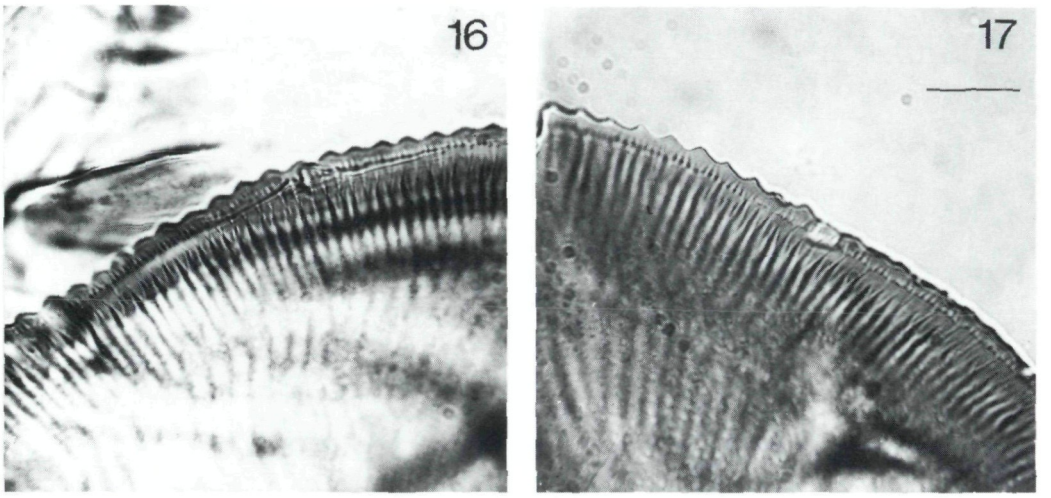
Larvae of *G. pallens* (n = 10)

Length about 10 mm; anterior parapods with simple serrated claws, located on one side only (Fig. 10); one pair of thick ventral tubules present on segment VIII.

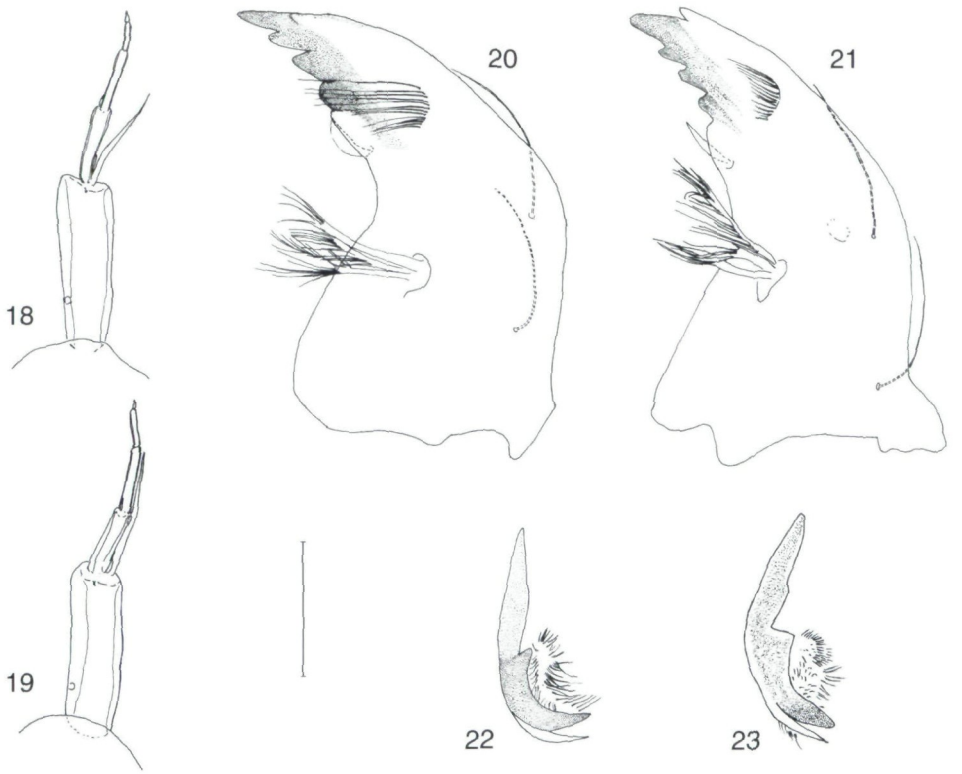
Head: Setae SI long, apical serrations on both sides, setae SII simple; pecten epipharyngis with 10 - 12 teeth (Fig. 12); chaetulae strongly serrated; submentum with six lateral teeth, middle tooth almost 1.5 times broader than the first lateral tooth and almost at the same level as these (Fig. 14); Paralabial plates well striated as in Fig. 16, front border with a small tip; antennae (Fig. 18) about 190 µm long, with 5 segments; bristle of the antenna reaching to the middle of the third segment; ring organ in the first third of basal segment; mandibles with a pale dorsal tooth, the other 4 teeth darkened; seta subdentalis leaf-shaped (Fig. 20); premandibles with 2 apical teeth; the inner tooth broader and darker than the outer tooth (Fig. 22); maxilla with well developed maxillary palp, containing four teeth; lacinial chaeta elongated; apex of maxillary sclerite with 3 - 4 rounded denticles; prementum rounded, in the middle with light teeth, laterally with many chaetulae.

Larvae of *G. glaucus* (n = 10)

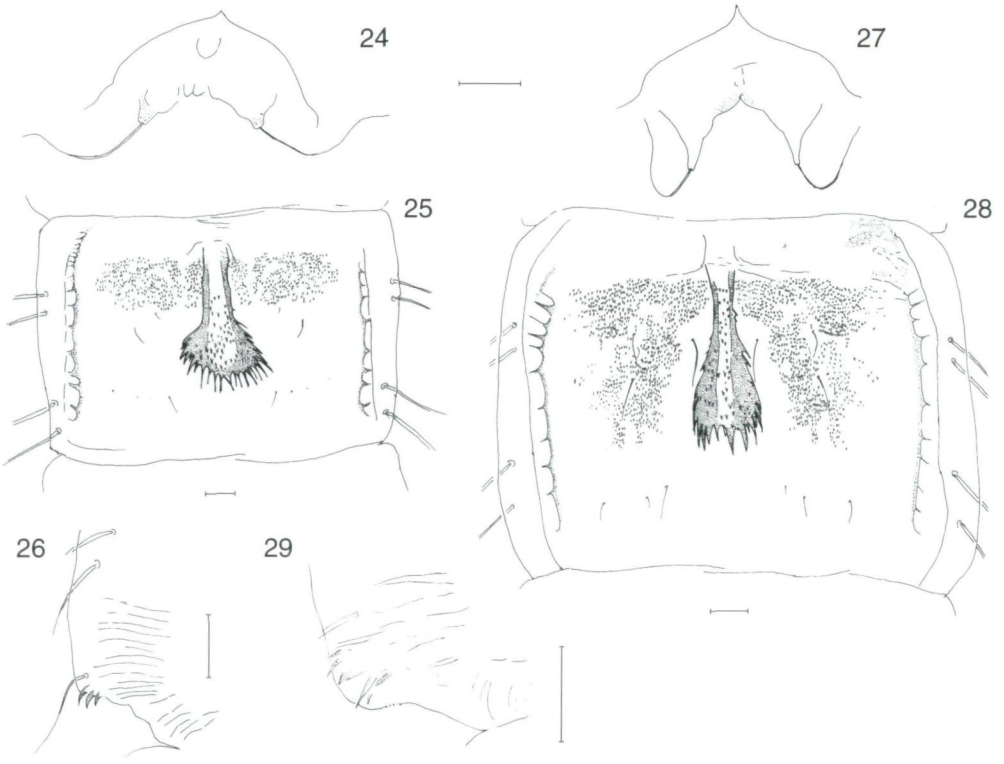
Length about 12 mm; anterior parapods are visible with serrated claws (Fig. 11); one pair short ventral tubules on segment VIII.



Figs. 16 - 17. Paralabial plates of larvae of (16) *G. pallens* and (17) *G. glaucus*.



Figs. 18 - 23. Antenna (18 - 19), mandibles (20 - 21), and premandibles (22 - 23) of larvae: (18, 20, 22) *G. pallens*, (19, 21, 23) *G. glaucus*; scales = 100 µm.



Figs. 24 - 29. Frontal apotome and cephalic tubercles (24, 27), racquet-shaped plate and shagreen on segment VI. (25, 28), and anal comb (26, 29) of pupae: (24 - 26) *G. pallens*, (27 - 29) *G. glaucus*; scales = 100 µm.

Head: Seta SI apically serrated; chaetulae long; setae SII simple; pecten epipharyngis with 10 - 12 teeth (Fig. 13); submentum with six lateral teeth. Median tooth of submentum lower than the first lateral tooth (Fig. 15); third lateral tooth is shorter than the others; paralabial plates typically striated (Fig. 17); antennae (Fig. 19) with 5 segments. Bristle of the antenna reaching to the end of the third segment; second and third segment enlarged; Mandibles with a pale dorsal tooth and 4 darkened teeth; seta subdentalis narrow and elongated (Fig. 21); premandibles with 2 apical teeth: inner tooth broader and darker than the outer tooth (Fig. 23); maxilla with well developed maxillary palp; apex of maxillary sclerite with 4 - 5 very small, slightly visible denticles.

Pupae of *G. pallens* (n = 12)

Length of the exuviae 10 mm; frontal apotome distinct, rounded, with short cephalic tubercles (Fig. 24); pedes spurii B (PSB) on segments II and III very small, only visible on segment II; 60 - 65 hooklets on segment II in one row. There is individual variability in the size of the racquet-shaped plates on tergites II - VI. The racquet-shaped plate on tergite VI and the shagreen on segment VI (Fig. 25) show the least variability. Anal combs on segment VIII consisting of a variable number of elongated spines (Fig. 26).

Pupae of *G. glaucus* (n = 10)

Length of the exuviae 13 mm; frontal apotome distinct and not rounded; cephalic tubercules long, especially in the population from "Chelopechene" (Fig. 27). Pedes spurii B well visible on segment II; 50 - 55 intersegmental hooklets on segment II; shagreen on abdominal tergites II - VI present, showing great variability. Most typical and constant is the racquet-shaped plate on tergit VI and the shagreen on segment VI (Fig. 28). Anal combs on segment VIII consisting of 5 - 7 short teeth (Fig. 29).

Morphology of adult males

Mainly alcohol preserved specimens of adult males, reared material including larvae and pupae, and some pinned specimens from the collection of the NHMW were studied. Measurements were made on specimens mounted in Euparal.

The terminology is according to SÆTHER (1980).

Glyptotendipes pallens (MEIGEN)

Material: Coll. NHMW, pinned specimens: **Lectotype** (♂, present designation) "*pallens* Coll. Winthem", "*pallens*" (Meigen's handwriting) and "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting), "Lectotypus des. Contreras-Lichtenberg".

1 ♂, "Coll. Winthem", "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting); 1 ♂, "Zerny Burgenland Apetlon 31.5.28", "*Glyptot. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Austr. sup. Rosenhof 22.7.78 Mik", "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Austr. Mik", "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Puterersee, Ennstal, leg. H. Franz, 20.5.1948", "*Glyptotendipes pallens* Mg." (Goetghebuer's handwriting).

Coll. NHMW, alcohol preserved material: 6 ♂♂ Shabla, Bulgaria V.1993, Michailova leg. et det.

Coll. NHMW, euparal mounted specimens: 3 ♂♂ Chelopecene, Bulgaria, VIII.1993, Michailova leg. et det.; 1 ♂ Hallateich/Austria inf. 8.1965, Contreras-Lichtenberg leg. et det.

Coll. Langton: 1 ♂ (reared specimen) "Iv78/fLa 6 Pe Wicken Main Lake", "*Glyptotendipes pallens* ♂ Langton leg. et det.".

ex Coll. RIScNB: 1 ♂, **type** of *Chironomus juncicola* KIEFFER: "*Chironomus juncicola* K." (Goetghebuer's handwriting), "R.I.Sc.N.B. 18 037 Coll. et det. M. Goetghebuer"; "*Glyptotendipes pallens* Contreras-Lichtenberg det.". The genitalia of the pinned specimen are not dissected; another hypopygium is mounted in canada-balsam together with this specimen.

Length: in µm (n = 5, if not stated otherwise): thorax: 2046.92 (1898.00 - 2190.00); abdomen: 5763.35 (5066.20 - 7081.00) (n = 4); total: 7847.50 (7197.80 - 9271.00) (n = 4).

Head: (n = 5, if not stated otherwise) dark brown; antennae dark brown; AR: 3.79 - 4.0 (n = 2); frontal tuberculi generally present, very small. Length of frontal tuberculi 3.63 µm, width of frontal tuberculi 7.26 µm (n = 3); temporal setae: 29 (28 - 31) on every side (n = 2); clypeus with 42 (36 - 46) setae (n = 3); cibarial setae: 25 - 26 (n = 2); clypeus with 5 palpomeres; length of palpomeres in µm (n = 3): P_1: 92.12 (88.20 - 99.96); P_2: 70.56 (58.00 - 82.32); P_3:235.20 (205.80 - 264.60); P_4: 215.60 (205.80 - 223.44); P_5: 358.68 (317.52 - 399.84).

Thorax: pronotum well developed, widely separated at v-shaped notch; mesonotum, metanotum, and mesosternum dark brown; scutellum brown, mesonotal vittae dark brown; humeral pit clear.

Fig. 30. Hypopygium of ♂ of *G. pallens*: (a) dorsal view, (b) ventral view, (c) lateral view; scale = 100 µm.

Chaetotaxy: 21 (n = 1) acrostichals, reaching beyond the middle of the mesonotum; 32 - 38 (multiserial dorsocentrals on each side of the mesonotum (n = 2); 10 - 11 praealars; proximal prealars biserial (n = 3), 2 - 3 postalar setae (n = 2); 46 - 55 scutellar setae (n = 2).

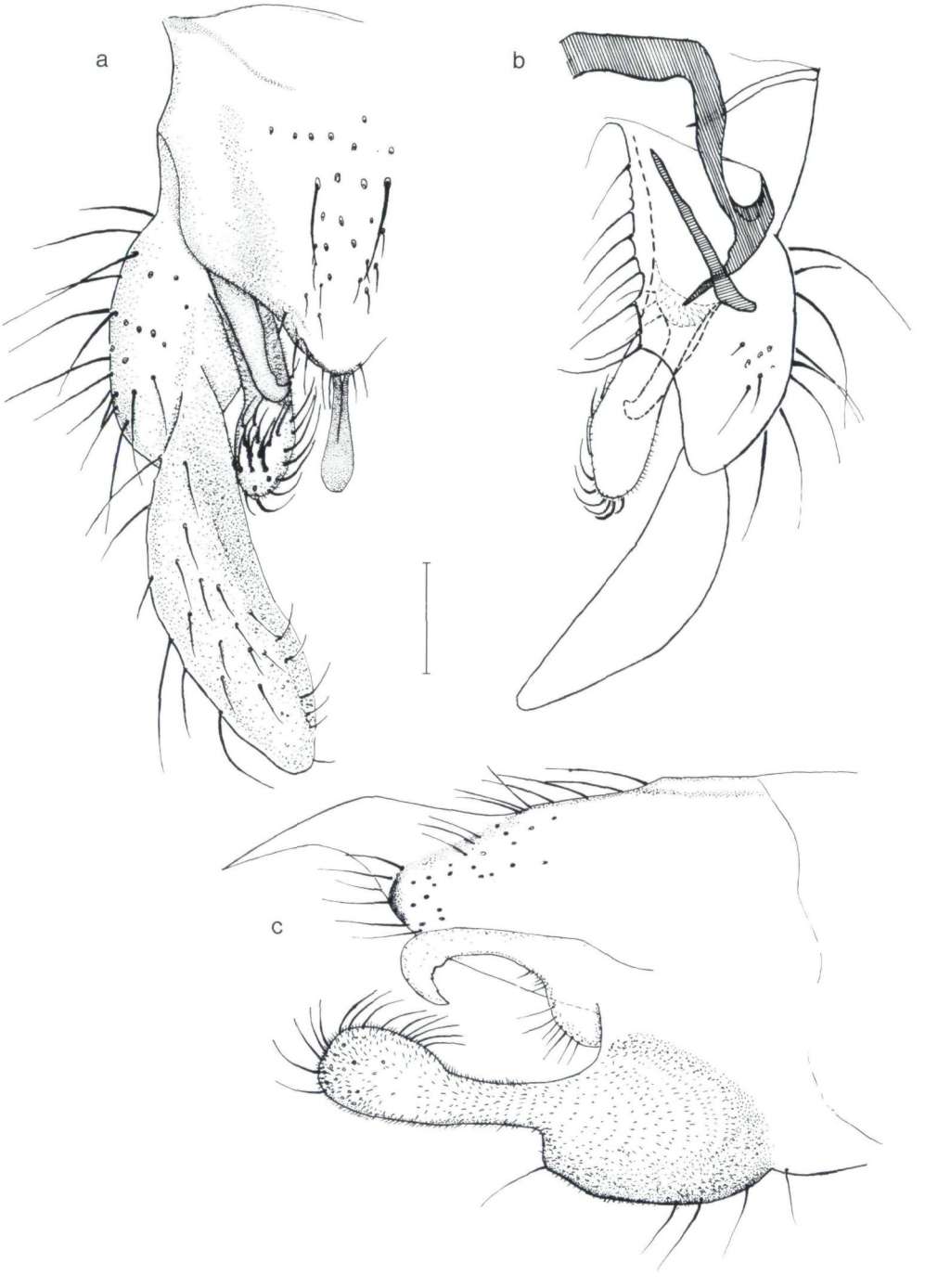


Fig. 31. Hypopygium of ♂ of *G. glaucus*: (a) dorsal view, (b) ventral view, (c) lateral view; scale = 100 µm.

Wing hyaline, costa, radius, media, and r-m brown, a brown mark located under the arculus; squama fringed; length: 3467.50 (3343.40 - 3518.60) (n = 4); width: 986.96 (934.40 - 1051.20) (n = 5); Ar-rm: 1556.36 (1460.00 - 1722.80) (n = 5); Ar-FCu: 1632.28 (1591.40 - 1752.00) (n = 5).

Legs: fore tarsus in pinned specimens with beard, pulvilli large, lobe-shaped; mid and hind tibiae with two spured combs; coloration of the legs: femora brown, distal part dark brown, tibiae and tarsomeres dark brown; Midlegs: sensilla chaetica on metatarsus: 13 (12 - 15) (n = 3).

Measurements of legs (in µm; n = 5, if not stated otherwise):

	fore leg	mid leg	hind leg
Fe	1362.67 (1314.00 - 1460.00)	1474.60 (1387.00 - 1606.00)	1591.40 (1533.00 - 1649.80)
Ti	1401.60 (1314.00 - 1533.00)	1477.52 (1343.20 - 1737.40)	1792.88 (1591.40 - 2000.20)
Ta_1	2087.80 (1927.20 - 2190.00)	805.92 (759.20 - 876.00)	1232.24 (1197.20 - 1255.60)
Ta_2	1012.27 (978.20 - 1036.60)	525.60 (511.00 - 569.40)	756.28 (730.00 - 817.60)
Ta_3	793.27 (773.80 - 817.60)	397.12 (379.60 - 423.40)	589.84 (584.00 - 613.20)
Ta_4	725.13 (686.20 - 773.80)	286.16 (262.80 - 321.20)	350.40 (321.20 - 365.00; n = 4)
Ta_5	330.93 (306.60 - 365.00)	195.64 (189.80 - 219.00)	222.65 (204.40 - 248.20; n = 4)
LR	1.49 (1.43 - 1.58)	0.55 (0.55 - 0.57)	0.69 (0.63 - 0.75)
BV	1.69 (1.63 - 1.73)	2.67 (2.60 - 2.75)	2.40 (2.29 - 2.51; n = 4)
SV	1.32 (1.24 - 1.37)	3.66 (3.59 - 3.82)	2.74 (2.62 - 3.91)

Hypopygium (Fig. 30a-c): Anal point stout, curved to the ventral side; superior volsellae curved, from the dorsal view stout.

Glyptotendipes glaucus (MEIGEN)

Material: Coll. NHMW, pinned specimens: **Neotype** (♂, present designation) "Kiel coll. Winthem", "Neotypus des. Contreras-Lichtenberg".

1 ♂ "Holland v.d.W.", "*annularius* det. Schiner", "Schiner 1869", "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Austr. inf. Hainfeld 15.8.93 Mik", 1 ♂ "Mann Tultscha 1865", "*annula-*

rius Alte Sammlung", "4", "*Glypt. glaucus*" (Goetghebuer's handwriting); 1 ♂ "Zerny Hungaria oc. Kl. Schützen 26.6.16", "*Glyptotend. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "*obscuripes* Coll. Winthem", "*obscuripes* mihi" (Meigen's handwriting), red type-label, "*Glyptot. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Austr. inf. Hainfeld Mik 28.8.93", "*Glyptotend. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Austr. sup. Rosenhof 22.2.78 Mik", "*Glyptotendipes glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "*pallens* Coll. Winthem", "*Glyptot. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Coll. Winthem", "*Glyptotendip. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Coll. Winthem", "*Glyptotend. glaucus* Mg." (Goetghebuer's handwriting); 1 ♂ "Coll. Winthem"; 1 ♂ "Coll. Mik"; euparal mounted specimens: 1 ♂ "Shabla, VIII.93", "*Glyptotendipes glaucus* 3rd form Michailova leg. et det."; 1 ♂ "Schönau/NÖ Zucht 26.7.1993 Contreras-Lichtenberg leg."; 2 ♂♂ "Lab. Stock Michailova, 20.1.1987".

ex Coll. Langton: 1 ♂ "reared specimen 30.6.75 The Chain", "*Glyptotendipes glaucus* ♂ (Pe2) det. PH Langton 9.10.76".

Coll. R.I.Sc.N.B.: 1 ♂ (**type** of *G. norderneyanus* KIEFFER) "*Glyptotend. norderneyanus* K." (Goetghebuer's handwriting), "R.I.Sc.N.B. 18 037 Coll. et det. M. Goetghebuer", "*Glyptotendipes glaucus* Contreras-Lichtenberg det.". The specimen appears to have been pinned immediately after hatching. The hypopygium is mounted on a celluloid label.

1 ♂ (**type** of *G. nudifrons* KIEFFER) "*Glyptotend. nudifrons* K." (Goetghebuer's handwriting), "R.I.Sc.N.B. 18 037 Coll. et det. M. Goetghebuer", "*Glyptotendipes glaucus* Contreras-Lichtenberg det.". The hypopygium is mounted on a celluloid label.

3 ♂♂ (**syntypes** of *G. brevifilis* KIEFFER) "*Glyptotend. brevifilis* K." (Goetghebuer's handwriting), "R.I.Sc. N.B. 18 037 Coll. et det. M. Goetghebuer", "*Glyptotendipes glaucus* Contreras-Lichtenberg det.". The hypopygia are mounted on celluloid labels.

Length (in µm, n = 5): thorax: 2318.48 (1898.00 - 2598.80); abdomen: 6675.12 (6073.60 - 7358.40); total: 8935.20 (8117.60 - 9490.00).

Head: (n = 5, if not stated otherwise) dark brown; antennae dark brown; AR: 4.06 (3.83 - 4.44) (n = 4); frontal tubercles generally missing, only small marks present.

Temporal setae: 26 (23 - 29) on every side; clypeus with 48 (40 - 57) setae (n = 4); cibarial setae: 25 - 26 (n = 2); clypeus with 5 palpomeres; length of palpomeres in micrometers: P_1: 99.96 (70.66 - 117.60); P_2: 105.84 (88.20 - 117.60); P_3: 285.77 (205.80 - 341.04); P_4: 252.84 (235.20 - 294.00); P_5: 369.26 (299.88 - 441.00).

Thorax: pronotum well developed, widely separated at v-shaped notch, mesonotum, metanotum, and mesosternum dark brown; scutellum red-brown, mesonotal vittae dark brown; humeral pit clear, with granulate structure.

Chaetotaxy: 32 (n = 1) acrostichals, reaching beyond the middle of the mesonotum; 35 (30 - 50) multiserial dorsocentrals on each side of the mesonotum (n = 4); 9 - 14 multiserial praealars, 2 - 3 postalar setae; 77 (65 - 84) scutellar setae (n = 3).

Wing hyaline, costa, radius, and media brown, r-m dark brown; squama fringed; length: 4423.80 (3460.20 - 5037.00) (n = 4); width: 1153.40 (1022.00 - 1357.80) (n = 5); Ar-rm: 1918.44 (1576.80 - 2190.00) (n = 5); Ar-FCu: 2000.20 (1591.40 - 2409.00) (n = 5).

Legs: fore tarsus without beard, pulvilli large, lobe-shaped; mid and hind tibiae with two spured combs; coloration of the legs: femora brown, distal part dark brown, tibiae and tarsomeres dark brown; midlegs: sensilla chaetica on metatarsus: 17 (12 - 22).

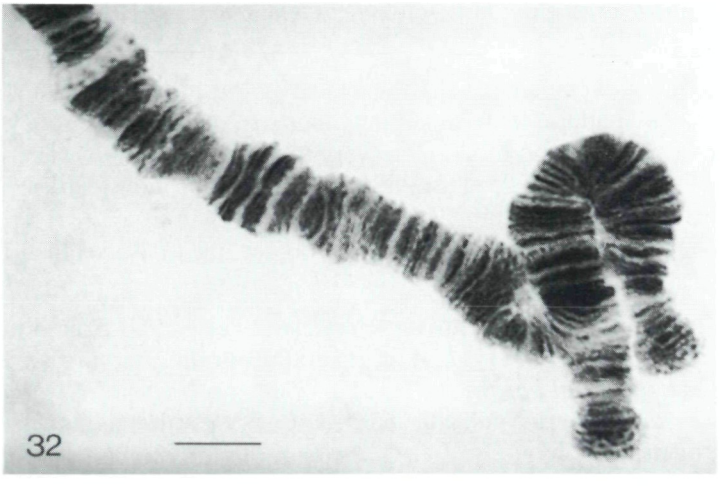
Measurements of legs (in µm, n = 5, if not stated otherwise):

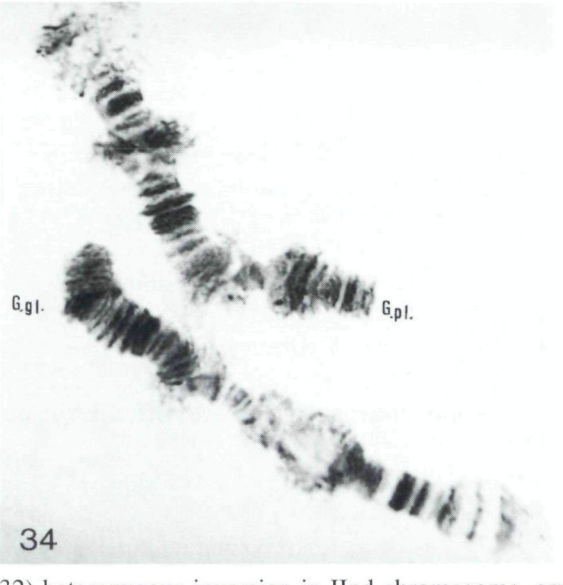
	fore leg	mid leg	hind leg
Fe	1772.44 (1649.80 - 2263.00)	1789.96 (1752.00 - 1912.60)	2003.12 (1606.00 - 2409.00)
Ti	1766.60 1460.00 - 2117.00)	1865.88 (1606.00 - 2219.20)	2152.04 (1898.00 - 2671.80)
Ta_1	(n = 2) 2117.00 - 2482.00	938.05 (n = 4) (803.00 - 1022.00)	1456.35 (n = 4) (1211.80 - 1752.00)
Ta_2	(n = 2) 1022.00 - 1109.60	584.00 (n = 4) (511.00 - 657.00)	923.45 (n = 4) (759.20 - 1095.00)
Ta_3	(n = 2) 803.00 - 832.20	448.95 (n = 4) (408.80 - 496.40)	733.65 (n = 4) (613.20 - 861.40)
Ta_4	(n = 2) 759.20	313.90 (n = 4) (292.00 - 335.80)	438.00 (n = 4) (379.60 - 511.00)
Ta_5	(n = 2) 335.80 - 394.20	229.95 (n = 4) (204.40 - 262.80)	259.15 (n = 4) (219.00 - 292.00)
LR	(n = 2) 1.36 - 1.45	0.53 (n = 4) (0.50 - 0.54)	0.67 (n = 4) (0.64 - 0.74)
BV	(n = 2) 1.73 - 1.95	2.84 (n = 4) (2.76 - 2.96)	2.13 (n = 4) (1.77 - 2.45)
SV	(n = 2) 1.38 - 1.44	3.78 (n = 4) (3.64 - 3.91)	2.84 (n = 4) (2.32 - 3.53)

Hypopygium (Fig. 31a-c): anal point elongated, slightly curved to the ventral side; superior volsellae slender, middle part straight and parallel to the anal tergite.

Diagnostic characters for the differentiation of *G. pallens* and *G. glaucus*

Detailed analysis of all stages of metamorphosis of *G. glaucus* and *G. pallens* allows us to consider these species to be closely related. Chromosome data clearly indicate a close relationship between these species. Band patterns in both species show many blocks of genes which are in common and unchanged in both species. Other genes may be traced through homozygous inversions (IInd chromosome). In some chromosomes there are unidentical bands (IVth chromosome). Under laboratory conditions a hybrid was obtained in one direction of crossing: *G. pallens* ♀ x *G. glaucus* ♂ (egg hatchibility of crossing is about 50 %). This hybrid is characterized by a heterozygous inversion in arm D (Fig. 32) while the initial parent forms can be distinguished by a homozygous inversion. Also, the homologues of chromosome G are completely unpaired (Fig. 34): both species have different band pattern in this chromosome. In arm B, at the telomere region, both homologues are unpaired (Fig. 33). This character has been observed in males only. This region possibly contains the male sex determing mechanism. Further analysis in this aspect should solve the problem. In nature, hybrids were found, which have been produced after backcrossing (F1 x *G. pallens*) (MICHAILOVA, in press); Ist, IInd, IIIrd chromosomes have band patterns like those of *G. pallens;* the IVth chromosome has a hybrid origin. One homologue belongs to *G. pallens,* the other to *G. glaucus.*





Figs. 32 - 34. Hybrid chromosomes: (32) heterozygous inversion in IInd chromosome, arm D, (33) Arm B, unpaired region, (34) G-chromosome.

The most reliable difference between the larvae of *G. pallens* and *G. glaucus* is the size of middle tooth of the submentum (Figs. 14, 15). In *G. glaucus* it is lower and much broader than the first lateral tooth. The gula of *G. glaucus* is dark over the whole area, in the middle part and laterally, whereas in *G. pallens* the dark colour is mostly confined to its posterior part. The striation of the paralabial plates is also a useful character for differentiation of both species (Figs. 16, 17).

Occasionally, ventral tubules on segment VIII of *G. pallens* are longer than those of *G. glaucus*. Both species are distinguishable by the shape of the seta subdentali of the

mandible. In *G. pallens* it is leaf-shaped, in *G. glaucus* it is narrow and elongated (Figs. 20, 21).

Pupae of *G. pallens* and *G. glaucus* can be distinguished by the following characters: Morphology and size of frontal apotome: rounded in *G. pallens*, not rounded in *G. glaucus* (Figs. 24, 27), size of the cephalic tubercules (very short in *G. pallens*) (Figs. 24, 27), the shagreen of segment VI (Figs. 25, 28), the number and morphology of teeth in the comb of segment VIII: a variable number of elongated spines in *G. pallens* and 5 - 7 short teeth in *G. glaucus* (Figs. 26, 29). Pedes spurii B bigger in *G. glaucus* than in *G. pallens*.

Male adults can be distinguished by the following characters: very small frontal tuberculi in *G. pallens* generally present, in *G. glaucus* generally missing; tarsi of forelegs bearded in dried specimens of *G. pallens*, not bearded in dried specimens of *G. glaucus*; hypopygium of *G. pallens* with superior volsellae curved and not parallel to the anal tergite; superior volsellae of the hypopygium of *G. glaucus* in the middle part parallel to the anal tergite (Figs. 30 - 31).

References

CONTRERAS-LICHTENBERG, R., in press: Contribution to the knowledge of female west Palaearctic *Glyptotendipes* KIEFFER (Diptera, Nematocera, Chironomidae). – Hydrobiologia.

EDWARDS, F.W. 1929: British non-biting midges (Diptera, Chironomidae). – Transactions of the Royal Entomological Society London 77: 279-430.

GOETGHEBUER, M. & F. LENZ 1937: Tendipedidae - Tendipedinae (Chironomidae - Chironominae). – in E. LINDNER (ed.): Die Fliegen der palaearktischen Region 13c. 3(1): 1-48.

KALUGINA, N. 1963: Systematics and development of *Glyptotendipes glaucus* MEIGEN, and *G. gripekoveni* KIEFFER (Diptera, Chironomidae). – Ent. Obozr. 42(4): 879-908 (in Russian).

KEYL, H.G. & I. KEYL 1959: Die cytologische Diagnostik der Chironomiden I. Bestimmungstabelle für die Gattung *Chironomus* auf Grund der Speicheldrüsen-Chromosomen. – Archiv für Hydrobiologie 56: 43-57.

KRUSEMAN, G. 1933: Tendipedidae Neerlandicae. I: Genus *Tendipes* cum generis finitimis. – Tijdschr. Ent. 76: 119-216.

MEIGEN, J.W. 1804: Klassifikazion und Beschreibung der europäischen Zweiflügeligen Insekten (Diptera Linn.). Vol. 1, Braunschweig, XXVIII + 152 pp., 8 Kupfertafeln.

MEIGEN, J.W. 1818: Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Vol. 1, Aachen, XXXVI + 332 pp., 11 Kupfertafeln.

MICHAILOVA, P. 1979: Comparative karyological analysis of the species of the genus *Glyptotendipes* KIEFFER (Diptera, Chironomidae). – Caryologia 32(1): 23-44.

MICHAILOVA, P. 1985: Method of breeding the species from family Chironomidae, Diptera in experimental conditions. – Compte R. Acad. Bulgare Sci. 38(9): 1179-1181.

MICHAILOVA, P., in press: Cytotaxonomical characteristics of Chironomidae, Diptera from Hungary. - Studia Dipterologica.

SÆTHER, O.A. 1980: Glossary of chironomid morphology terminology (Diptèra: Chironomidae). – Ent. scand. Suppl. 15: 51 pp.