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Goeldichironomus neopictus, a new species from the southeast of Brazil: description and bionomic information

(Insecta, Diptera, Chironomidae)

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This study describes the immature stages and adults of *Goeldichironomus neopictus*, a new species from the southeast of Brazil which lives in marginal aquatic vegetation in lentic environments. The imago presents morphological characteristics of the *pictus* group, but with a different pattern of thoracic and abdominal coloration. Egg masses obtained from field-collected females were maintained until eclosion (nearly 44 hours). Under laboratory conditions (20–26 °C) the cohort completes its life cycle in an average of 27 days (23–33 days). Through the morphometric dimensions and duration of each instar, length and weight curves for the species were constructed and some bionomic and biometric characteristics were established.

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Introduction

During an intensive survey program of the reservoirs in the São Carlos region (São Paulo State, Brazil) we found a new morphospecies of *Goeldichironomus* Fittkau, 1965, a genus with nine previously recognized species (Spies & Reiss 1996), distributed in subtropical and tropical areas from South America to southern North America and Hawaii, and occurring in littoral biotopes of standing waters (Reiss 1974).

In this article we describe the tenth species for the genus, from mature larvae, pupae and adults, and summarize bionomic and morphometric information obtained for this species from laboratory rearings. All the material examined was mounted on slides, and the morphological terminology used follows Saether (1980). The measurements are given by a mean value followed by the ranges in parentheses.

Goeldichironomus neopictus, spec. nov.

Types. Holotype: ♂ imago, São Carlos, SP, Brazil, Represa do Monjolinho, University Campus (UFSCar), May 1982. – Paratypes: 3♂ imagoes, 1♂ imago and its pupal exuviae, 5♀ imagines, 4 pupae and 5 larvae, from the same locality, May 1982. The holotype and most paratypes are deposited in the Laboratory of Aquatic Entomology collection of the Federal University of São Carlos, São Paulo, Brazil (UFSCar). One male paratype is deposited in the Zoologische Staatssammlung, Munich, Germany.

Description

Male imago (n=5).

Total length. 5.5 mm (5.4-6.2). Color greenish yellow with dark brown thoracic markings and brown bands on abdomen.

Head. Pale yellow. Antenna and plume yellowish; AR = 3.37 (3.13-4.23). Maxillary palps yellowish; palpomeres 1-5 = 48, 60, 240, 222, 360 mm.

Thorax (Figs 1a, b). Greenish yellow, with three pairs of dark brown mesonotal spots; the anterior 2 pairs are connected by a narrow band. Sternum yellowish brown. Scutellum greenish. Postnotum yellowish brown, slightly darker in distal portion. Thoracic setal count: Acrostichals 22 (20-23), dorsocentrals 30 (29-33), prealars 8, supraalar 1, scutellars 18 (17-20).

Wing. Length 2.7 mm (2.5-2.9), transparent with lightly pigmented veins; C ending close to R_{4+5} , before wing apex; R_{2+3} closer to R_1 ; FCu slightly more distal than RM; VR = 1.06; WW = 0.28.

Legs. PI: Femur, Tibia and Ta1 + Ta2 greenish yellow, each with an apical brown ring, other segments pale brown. PII and PIII: Femur and Tibia greenish yellow, other segments pale brown. Lengths in mm as in Table 1A.

Abdomen (Fig. 2). Greenish yellow. Tergites II-IV with brown bands along posterior margins. Hypopygium (Fig. 3). Anal point narrow with apex hooked to ventral (Fig. 4). Superior volsella sickle-like (Fig. 5). Inferior volsella microtrichiose, bearing coarse setae, some of them apically branched (Fig. 6). Gonostylus stout, with 8-9 setae on distal inner margin.

Female imago (n = 5).

Total length. 6.7 mm (5.9-7.2). Coloration as male, but generally darker.

Head. Antenna light brown; antennal flagellomeres 2-6 = 204, 156, 156, 162, 186 mm. Maxillary palpomeres 1-5 = 60, 60, 240, 276, 426 mm.

Thorax. Color pattern as male. Thoracic setal count: Acrostichals 28 (27-30), dorsocentrals 41 (40-43), prealars 8, supraalar 1, scutellars 20 (19-23).

Wing. Length 3.5 mm (3.4-3.7); VR = 1.10; WW = 0.36.

Legs. Lengths in mm according to Table 1B.

Abdomen. Brownish yellow; posterior bands of tergites II-IV less distinct.

Pupa (n=5).

Exuviae length 8.1 mm (7.5-8.6). Abdomen in dorsal aspect as in Fig. 7a. Tergite I without shagreen. Tergites II-VI with shagreen points enlarged near anterior and posterior margins. Sternites I-V with shagreen as in Fig. 7b. Segment VIII with brown anal comb bearing 5-8 marginal teeth (Fig. 8). Segments I-IV = 1, 3, 3, 3 L setae; V-VIII = 4, 4, 4, 5 LS setae. Anal lobe on each side with 1 stout dorsal seta and 75-80 taeniate fringe setae.

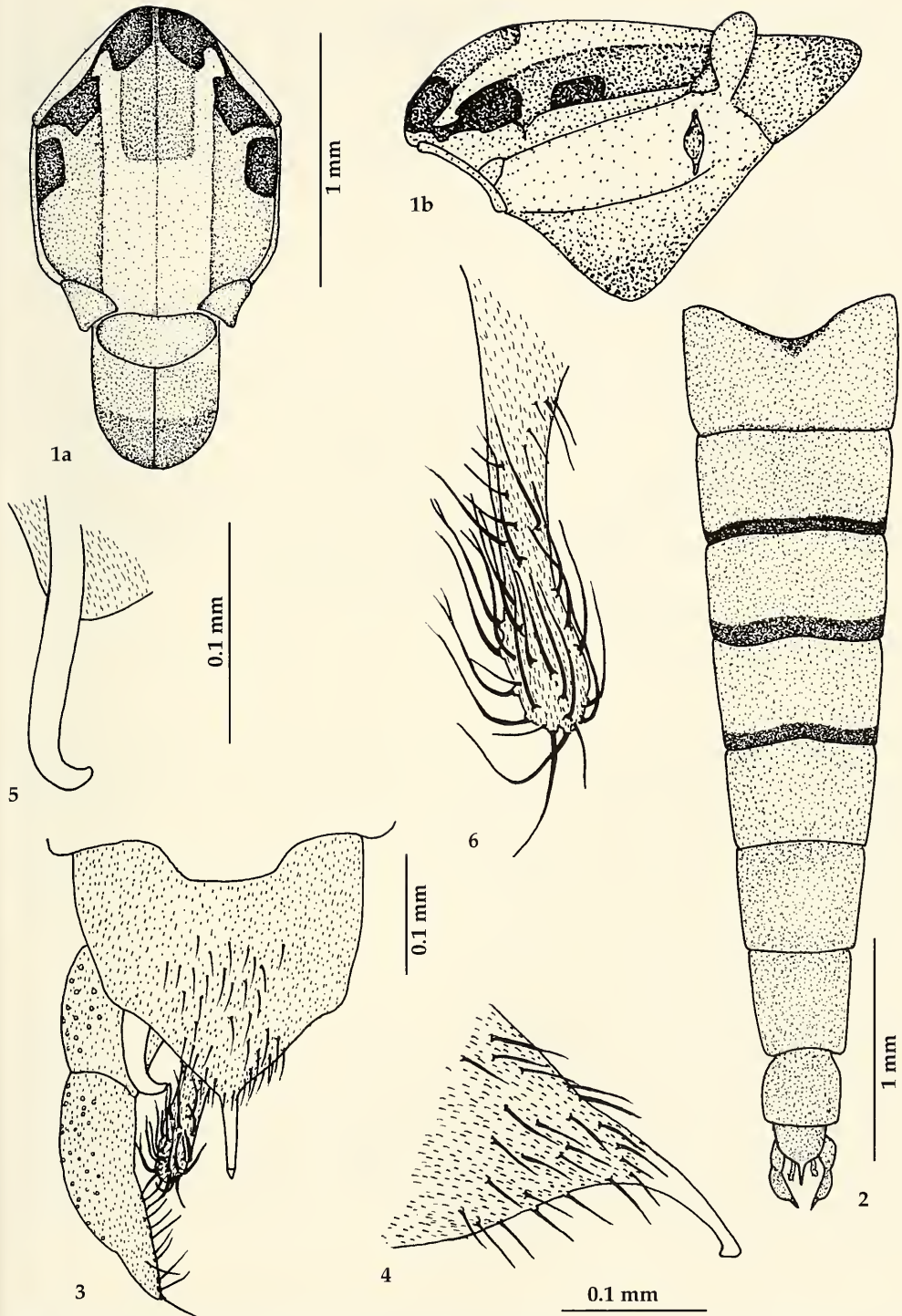
4th instar larva (n=5).

Total length 7.5 mm (6.8-8.5). Color red, head light brown with dark ventral occipital margin.

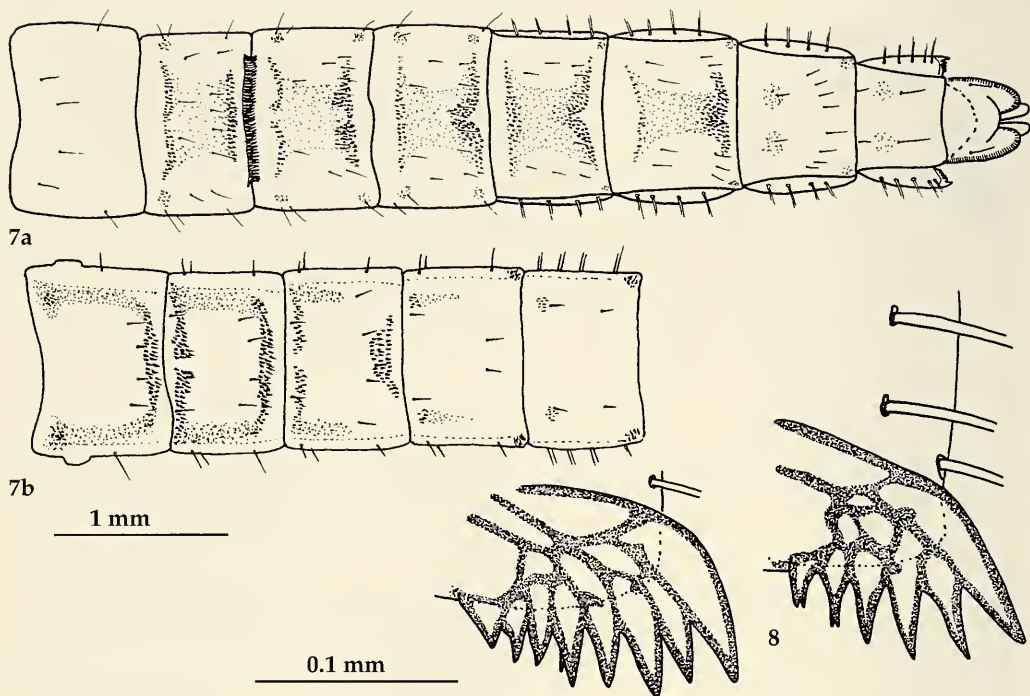
Head. IC = 0.71 (0.70-0.81). Width 0.54 mm (0.50-0.58), length 0.70 mm (0.68-0.78). Frontoclypeal apotome and labral sclerites 1 and 2 as in Fig. 9. Premandible with 3 teeth (Fig. 10). SI plumose on both sides (Fig. 11). Pecten epipharyngis with 10 longer and 5-6 smaller teeth (Fig. 12). Antenna (Fig. 13)

Tab. 1. Leg segments of *Goeldichironomus neopictus*, spec. nov. **A.** ♂ imago. **B.** ♀ imago.

| A | fe | ti | ta ₁ | ta ₂ | ta ₃ | ta ₄ | ta ₅ | LR |
|----------|------|------|-----------------|-----------------|-----------------|-----------------|-----------------|------|
| PI | 1200 | 1160 | 1520 | 760 | 680 | 680 | 280 | 1.31 |
| PII | 1200 | 1200 | 640 | 360 | 280 | 160 | 120 | 0.53 |
| PIII | 1280 | 1440 | 960 | 480 | 440 | 240 | 120 | 0.67 |
| B | fe | ti | ta ₁ | ta ₂ | ta ₃ | ta ₄ | ta ₅ | LR |
| PI | 1600 | 1600 | 2080 | 1040 | 960 | 1040 | 360 | 1.30 |
| PII | 1600 | 1640 | 800 | 440 | 320 | 160 | 120 | 0.49 |
| PIII | 1640 | 1960 | 1200 | 400 | 560 | 240 | 120 | 0.61 |



Figs 1-6. *Goeldichironomus neopictus*, spec. nov. ♂ imago. 1. Thorax. a. Dorsal view; b. Lateral view. 2. Abdomen. 3. Hypopygium. 4. Anal point, lateral view. 5. Superior volsella. 6. Inferior volsella.



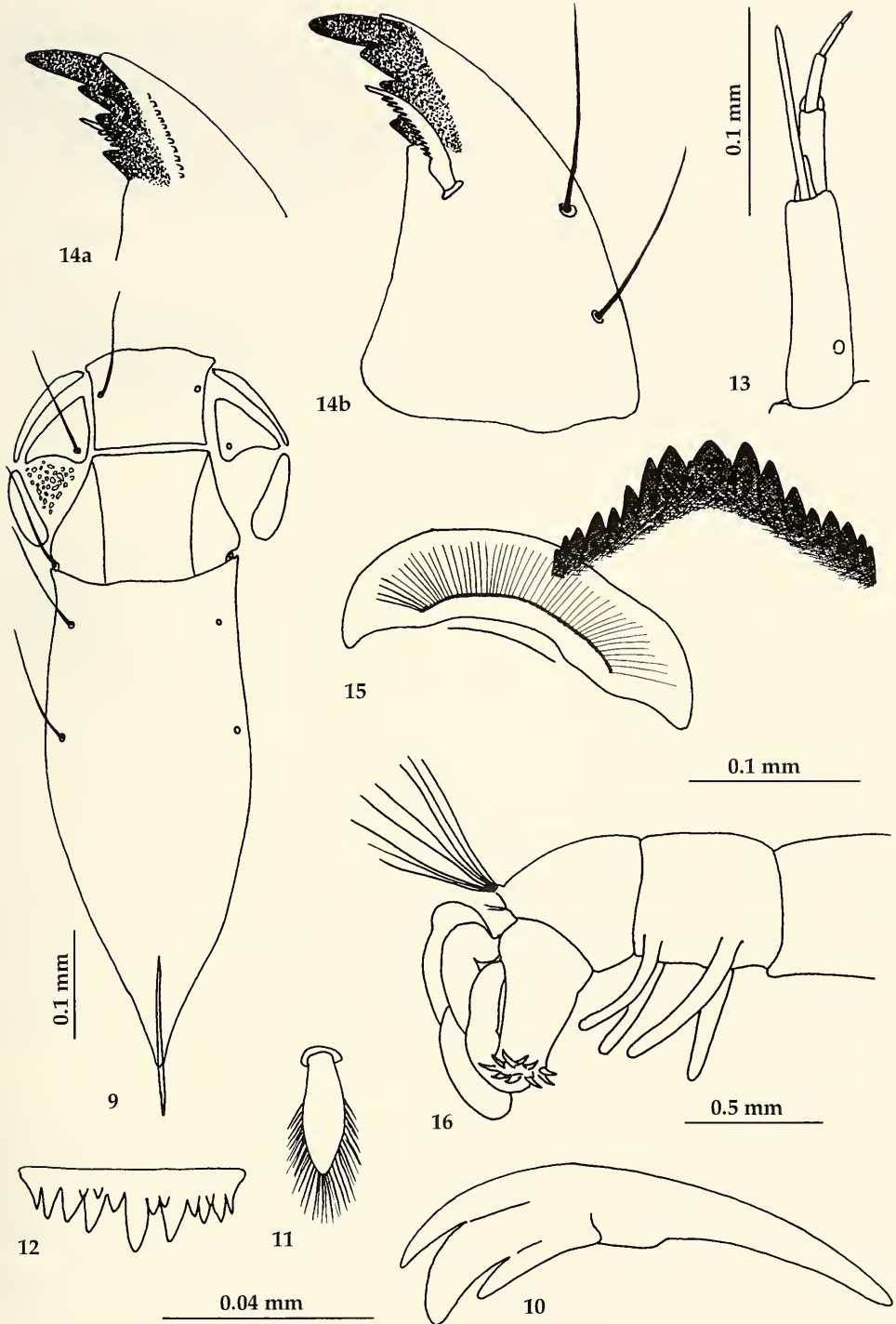
Figs 7-8. *Goeldichironomus neopictus*, spec. nov. Pupa. 7a. Abdominal tergites. 7b. Abdominal sternites I-V. 8. Anal comb variation.

length 0.19 mm (0.18-0.20); AR = 1.17; Ring organ near antennal base; blade not surpassing segment 4. Mandible (Figs 14 a, b) length 0.27 mm (0.24-0.30), with dark apical and three inner teeth and two small ventral teeth at the bases of the distal two inner teeth; dorsal tooth pale; seta subdentalis long and serrated. Mentum (Fig. 15) with slightly crenate median and 8-10 dark lateral teeth; fourth lateral tooth smaller than adjacent ones.

Abdomen (Fig. 16) with two pairs of slightly curved ventral tubules on segment VIII, measuring 0.62 mm (0.57-0.66) in length. Anal tubules large with a median constriction. Procercus with 8 coarse anal setae.

Remarks

Goeldichironomus neopictus, spec. nov. shares the characteristics of the *pictus* group, established by Reiss (1974), which includes *G. pictus*, *G. serratus*, and the more recent *G. carus* Contreras-Lichtenberg, 1982 and *G. maculatus* Trivinho-Strixino & Strixino, 1991, all with dark brown thoracic spots and/or dark brown abdominal bands. The new species displays the same thoracic pattern as *G. pictus*, differing in the absence of supraalar callus spots and in the presence of brown bands on posterior margins of abdominal tergites II-IV. In the latter aspect it approaches *G. maculatus* and *G. serratus*. In spite of the similarity of the immature forms, the shagreen presence on sternites IV and V of the pupa and the length of the ventral and anal tubules of the larva seem to be characteristics which differentiate *G. neopictus* from the other species of the group.



Figs 9-16. *Goeldichironomus neopictus*, spec. nov. Larva. 9. Frontoclypeal apotome and labral sclerites 1 and 2. 10. Premandible. 11. Labral seta Sl. 12. Pecten epipharyngis. 13. Antenna. 14. Mandible. a. Ventral view; b. Dorsal view. 15. Mentum and ventromental plate. 16. Posterior abdominal segments.

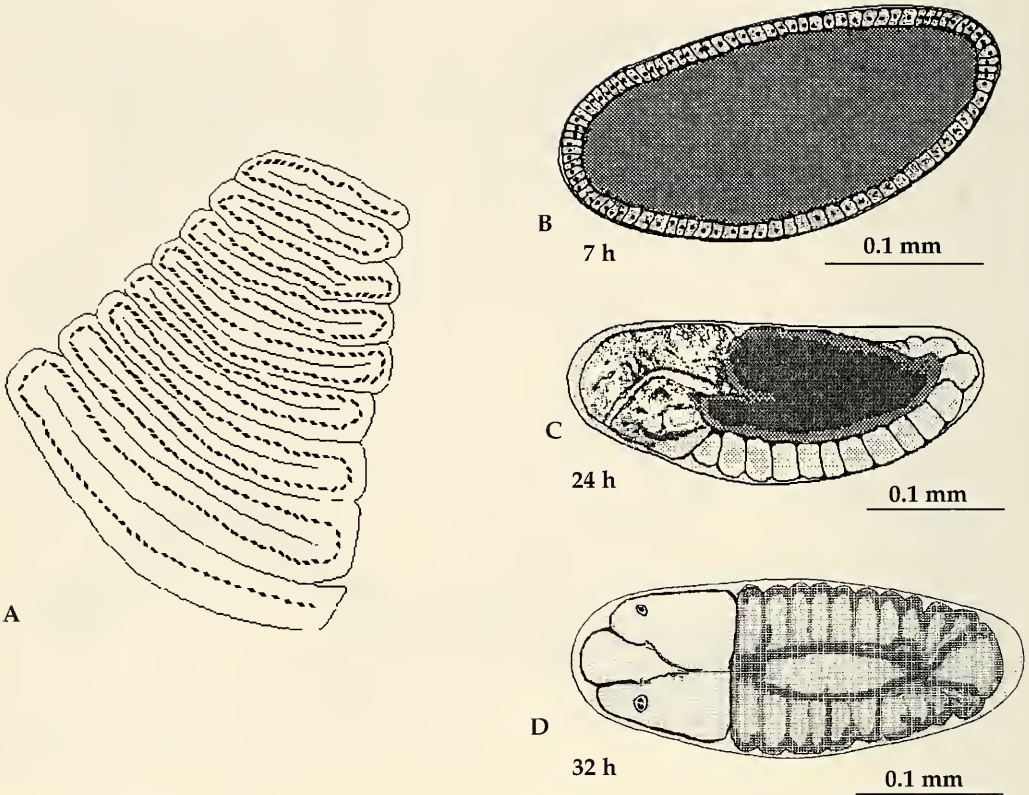


Fig. 17. A. *Goeldichironomus neopictus*, spec. nov. Egg mass. B, C, D. Embryo after 7, 24, and 32 hours.

Bionomics

The larvae of *G. neopictus* are associated with aquatic macrophytes, and were collected in stands of *Pontederia* and *Eichhornia* in a small reservoir (Represa do Monjolinho) situated on the university campus (UFSCar).

Since both adults and larvae were easily captured, and with the aim of obtaining additional information about the bionomics as a subsidy for bioassays, laboratory rearing was carried out which permitted the observation of oviposition and embryonic and larval development until the emergence of adults.

A. Oviposition and embryonic development

Female imagines captured in the field were maintained in flasks with water which were covered with nylon netting. During oviposition the female rests on the wall of the flask and, with its abdomen curved downwards, executes lateral movements until the eggs are completely expelled. The small egg mass remains attached to the female which, after undertaking circular flights, deposits it on the water surface. After water contact, the gelatinous mass takes on the appearance of a truncated triangle, containing 500-600 eggs (Fig. 17A).

The egg masses, maintained in glass petri dishes with distilled water, were periodically examined for embryonic developmental stages (Figs 17B, 17C, 17D) until hatching, which took place about 44 hours after oviposition.

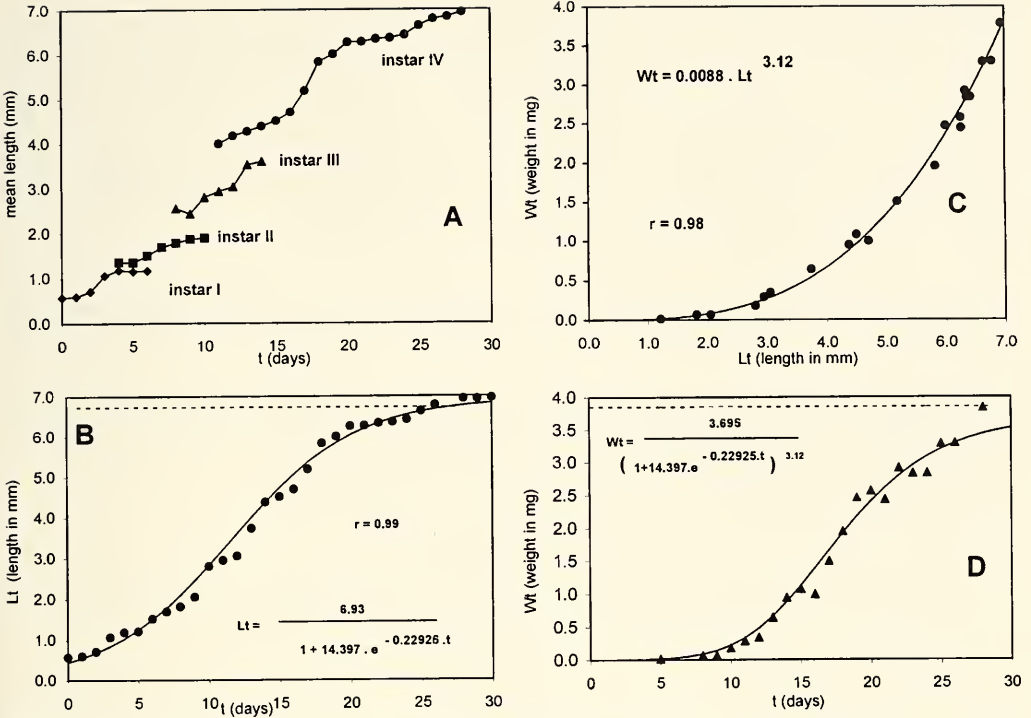


Fig. 18. *Goeldichironomus neopictus*, spec. nov. Biometric growth parameters. A. Growth length of each instar. B. Cohort growth length curve. C. Weight/length relation. D. Cohort growth weight curve.

B. Larval development

Newly hatched larvae were reared in plastic trays (4 l of distilled water + 1 g of chicken ration/week) and maintained at room temperature (20-26 °C) at a numerical density of approximately 100 larvae/0.1 m² (Strixino & Strixino 1982).

The cohort completed its life cycle in 27 days (23-33). Daily measurements of total larva length, head length, and larva weight permitted the identification of instars and an outline of some bionomic parameters for the species (Tab. II).

In spite of the slight size overlaps of the different instars (Fig. 18A), the mean growth-length curve (Fig. 18B) showed, in its linearly transformed form, a high correlation coefficient ($r = 0.99$), and was expressed by Krüger's growth model (Krüger 1973).

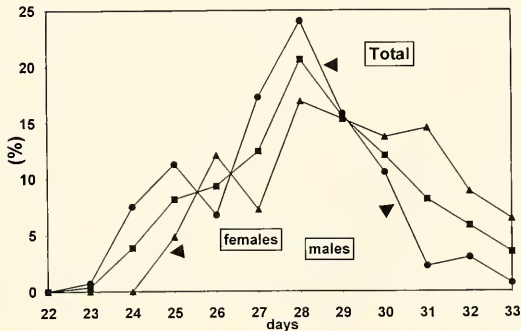


Fig. 19. *Goeldichironomus neopictus*, spec. nov. Emergence in laboratory culture.

Tab. II. Biometric parameters of each larval instar of *Goeldichironomus neopictus*.

| Instar | Length (mm) | Ventral head length (μ m) | Weight (mg) | Mean duration (days) |
|--------|----------------|-----------------------------------|----------------|-------------------------|
| | Min.-Max. | Min.-Max. | Min.-Max. | |
| 1 | 0.578-1.170 | 42- 48 | 0.0016-0.0143 | 4 |
| ri | 1.380-1.890 | 81- 90 | 0.0240-0.0641 | 4 |
| iii | 2.558-3.600 | 129-141 | 0.1640-0.4790 | 7 |
| iv | 3.990-6.941 | 216-234 | 0.6600-3.7130 | 12 |

The weight curve (Fig. 18D), using the same model, was obtained through the weight/length ratio (Fig. 18C), whose value of $\sigma = 3.12$ indicates nearly isometric growth (Mackey 1977; Balushkina 1982).

C. Emergence

The adults began to emerge 23 days after egg eclosion and continued for nearly 10 days, as shown in Figure 19. Under laboratory conditions, low mortality in both egg and larval stages was found, showing the species potential for bioassays.

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