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Karyological identification of some species of the genus *Chironomus* MEIGEN, 1803 from Belgium

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Abstract

Chironomus *larvae were caught in some lowland brooks and one pond in Flanders. Fourth-instar larvae were identified by means of a karyological study. It was the first time that Belgian animals were identified by using this technique. We have found one new species.* Chironomus melanotus *is reported from Belgium for the first time. We can also confirm the presence of two other species:* Ch. plumosus *and* Ch. riparius.

Samenvatting

Er werden Chironomus *larven gevangen in verschillende laaglandbeken en één vijver in Vlaanderen. De instar IV larven werden karyologisch geïdentificeerd. Het was de eerste keer dat deze techniek werd toegepast op dieren uit België. Wij hebben één nieuwe soort ontdekt.* Chironomus melanotus *werd voor het eerst gevonden in België. We kunnen eveneens de aanwezigheid van* Ch. plumosus *en* Ch. riparius *bevestigen.*

Introduction

Larvae of the genus *Chironomus* MEIGEN, 1803 have been notoriously difficult to identify. Although *Chironomus*-species are widespread and often dominate the benthic community of lakes and rivers, ecologists rarely attempt to distinguish them from each other. The best morphological keys that are available only refer to 26 species (WEBB & SCHOLL, 1985). It has been argued that as many as 60 species of *Chironomus* occur in Western Europe (FITTKAU & REISS, 1978). The problems with the identification of these animals have led in turn to a poor knowledge of their distribution and ecology. Only 13 species of *Chironomus* have been recorded from

Belgium (GODDEERIS & BEHEN, 1991; INT PANIS *et al.*, 1993). At present, a karyological identification seems to be the only effective way to identify species of *Chironomus*. Karyological identifications are often used as a basis for constructing morphological keys to larvae (WEBB & SCHOLL, 1985) and pupal exuviae (LANGTON, 1991). Because the correct identification of *Chironomus* larvae is important for our studies of benthic communities, a cooperation between the Institute of Cytology and Genetics at Novosibirsk and the Department of Biology of the U.I.A. in Antwerp was started. Our first goal is to establish with certainty which species occur in Belgium. It is the first time that Belgian chironomids are identified by using cytological methods.

Material and Methods

Larvae of *Chironomus* were sampled during the spring of 1994 in different habitats. Ponar samples were taken in the profundal zone of a clay pit (NIEL8) in the nature reserve Waelenhoek (Niel, Belgium) on 9.III.1994 and 6.IV.1994. The fauna of this habitat is very poor and is dominated by *Chaoborus flavicans* (Diptera, Chaoboridae) and *Chironomus* gr. *plumosus*. Handnet samples were also taken in several lowland brooks in the catchment of the river Nethe. The *Chironomus* larvae of these brooks are usually identified as *Chironomus* gr. *thummi*. Fourth-instar larvae were preserved in ethanol and glacial acetic acid (3:1). These larvae were cytologically identified at the Institute of Cytology and Genetics in Novosibirsk. Karyotype squashes with acetic-orcein staining were made with the routine cytological method of KEYL & KEYL (1959) and photomaps were prepared and mapped according to KIKNADZE *et al.* (1991). The head capsule and body of the larvae were mounted on the same slides, together with the karyotype.

Results

The karyological study resulted in the identification of four species of *Chironomus*, one of which is new to science. At least four other species probably also were found but should be studied further to confirm their identity. A description of the karyotypes and some information on the sample sites is given below.

Cytological identifications

Chironomus riparius MEIGEN, 1804

We can confirm the occurrence in Belgium of *Chironomus riparius*. We have found several larvae with karyotypes that completely match descriptions of this species. Larvae of this species were caught in the "Grote Nete", a tributary of the river Scheldt. It is a very common species that occurs in lowland brooks with a high organic load. It is often used for ecotoxicological studies (e.g. BERVOETS *et al.*, 1994).

Fig. 1. Karyotype of *Chironomus plumosus* (one specimen from NIEL8). AB, CD, EF, G: designations of chromosomal arms in chromosomes no. 1, 2, 3 and 4, respectively. N: nucleoli. Note that homologues G are not conjugated, this is a good marker of *Chironomus plumosus*. Arrows show centromeric bands.

Chironomus plumosus (LINNAEUS, 1758)

We can also confirm the occurrence in Belgium of *Chironomus plumosus*. One specimen that was caught in NIEL8, had a karyotype that completely matches the known banding pattern of this species. The centromeric

heterochromatin is larger than that of Russian populations of *Chironomus plumosus* (Fig. 1), but this is typical of some West European populations (MICHAILOVA, 1989).

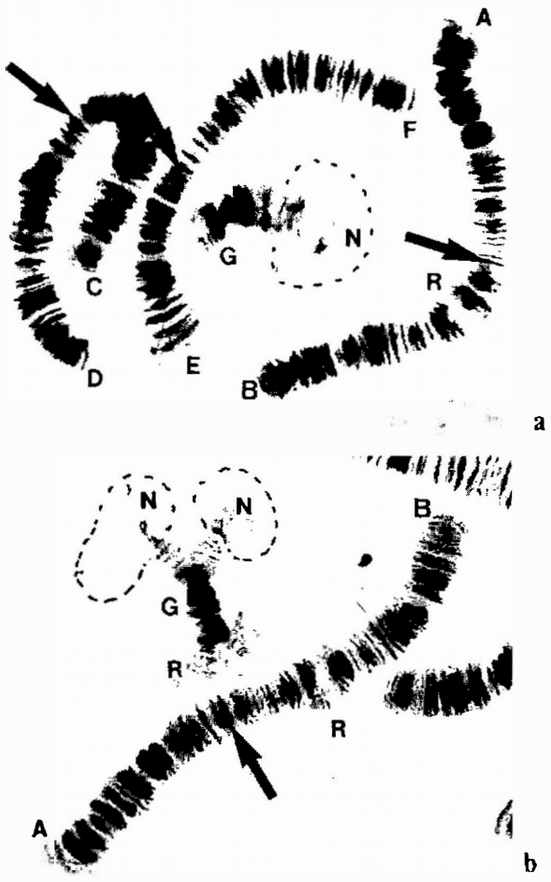

Fig. 2. Karyotype of the Belgian form of *Chironomus plumosus*. Designations as in figure 1. Note that homologues G are tightly conjugated as in *Chironomus balatonicus*. R: Balbiani ring.

Five larvae that were caught in the same habitat (the profundal zone of NIEL8) have karyotypes with banding patterns that are identical with *Chironomus plumosus*. However, the homologues of arm G (chromosome no. 4) are tightly conjugated in contrast to real *Chironomus plumosus* whose G homologues do not conjugate as a rule (Figs 1-2). All these

larvae have a fixed inversion in arm E (chromosome no. 3). Such characteristics were never found in 25 Siberian populations. We therefore suggest to name these animals: the "Belgian form" of *Chironomus plumosus*.

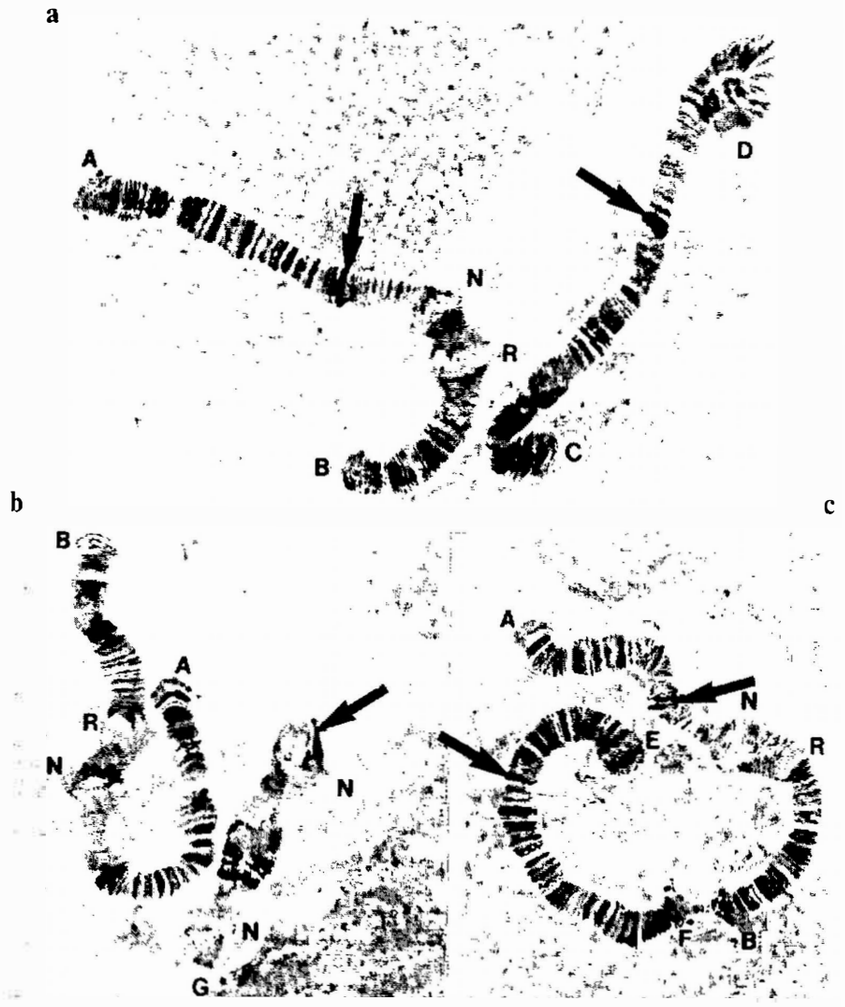

Fig. 3. Karyotype of *Chironomus* sp. Be2. a: Chromosome 1 (AB) and chromosome 2 (CD). Note that chromosome 1 of this species has a nucleolus (N) near the Balbiani ring (R). b: Chromosome 1 (AB) and chromosome 4 (G). Note that chromosome 4 has two nucleoli at both chromosomal ends like *Chironomus agilis*. c: Chromosome 1 (AB) and chromosome 3 (EF).

Fig. 4. Karyotype of *Chironomus melanotus* (specimen from the "Looiendse Nete"). The centromeric regions of all chromosomes are joined and form a chromocentre.

Chironomus sp. Be2, new species

Three larvae that were caught in the profundal zone of NIEL8 belong to a new species of the plumosus group. The karyotypes of these larvae differ from *Chironomus plumosus* by very specific banding sequences in arms B, D, F and G. Banding patterns in arms A, C and E are identical with those of *Chironomus plumosus*. The most specific character is the presence of a large nucleolus in arm B (chromosome no. 1) near the Balbiani ring. None of the sibling species in the plumosus group that have been described up to now, has a nucleolus in arm B. Arm G (chromosome no. 4) has two nucleoli, one on both ends, like in the karyotype of *Chironomus agilis* (Fig. 3).

Chironomus melanotus Keyl, 1961

Two larvae of this species were caught in the "Looiendse Nete", an unpolluted tributary of the "Kleine Nete", in March 1994. This is the first record of *Chironomus melanotus* from Belgium. The most characteristic feature of the karyotype is that the centromeric regions of all chromosomes are joined together and form a chromocentre (Fig. 4). However, this

chromocentre is not stable and in some squashes, the chromosomes can be seen separately.

cf. *Chironomus luridus* Strenzke, 1959

One larva, caught in the "Beneden Nete" in March 1994, has a karyotype that resembles the karyotype of *Chironomus luridus*. However, the state of the chromosomes was too bad for an accurate identification of this specimen.

Morphological identifications

We have caught several other types of *Chironomus* larvae during other sampling periods. These are: *Chironomus* cf. *muratensis* (Int Panis *et al.*, 1993), *Chironomus* gr. *fluviatilis*, *Chironomus* cf. *salinarius* and *Chironomus* cf. *dorsalis*. Further research will permit to identify them and to confirm their presence in Belgium.

Discussion

This preliminary karyological study of *Chironomus* larvae has revealed one new species and one new species record for Belgium. The presence of two other *Chironomus*-species was confirmed.

The most interesting observation is the presence of larvae belonging to a new species, *Chironomus* sp. Be2. It has been found together with *Chironomus plumosus* at a depth of approximately 4 metres in the profundal zone of an old clay pit. During winter, high oxygen concentrations occur in the water column at all depths. During summer, oxygen concentrations can drop to very low values in the profundal zone. We have demonstrated that, even before the onset of stratification, profundal larvae of *Chironomus plumosus* have a higher concentration of hemoglobin than the littoral specimens (Int Panis *et al.*, 1994). Because this new species occurs in the same habitat, we should investigate how it is adapted to survive in conditions of low oxygen concentrations and by what niche characteristics it differs from *Chironomus plumosus* so that they can occur together.

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Contribution à la connaissance du genre *Elaphidipalpus* JEANNEL, 1964 et description de trois espèces nouvelles (Coleoptera, Pselaphidae, Pselaphinae)

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Résumé

Le genre Elaphidipalpus *JEANNEL, 1964 et son espèce-type sont redécrits; trois espèces nouvelles (*E. bansartae *n. sp.*, E. endroedyi *n. sp. et* E. merckxi *n. sp.) d'Afrique du Sud sont décrites et illustrées. Un tableau dichotomique différencie les quatre espèces actuellement connues.*

Abstract

The genus Elaphidipalpus *JEANNEL, 1964 and its type species are redescribed; three new species from South Africa (*E. bansartae *sp. n.*, E. endroedyi *sp. n. and* E. merckxi *sp. n.) are described and illustrated. A key to the four species known so far is provided.*

Introduction

Dans le cadre de sa "Révision des Psélaphides de l'Afrique australe", JEANNEL (1964) a décrit au sein de la tribu des Tmesiphorini le genre *Elaphidipalpus*, très remarquable par la structure des palpes maxillaires et qui était jusqu'à présent uniquement représenté par son espèce-type, *E. leleupi* JEANNEL.

Parmi les Psélaphides d'Afrique du Sud communiqués par le Dr S. ENDRÖDY-YOUNGA figuraient trois espèces nouvelles d'*Elaphidipalpus* qui sont décrites ci-dessous. Ces matériaux additionnels me donnent l'occasion de compléter la diagnose du genre et de corriger quelques inexactitudes figurant dans la description originale.