THE CHROMOSOME NUMBERS OF SIXTEEN DRAGONFLY SPECIES FROM THE ARUN VALLEY, EASTERN NEPAL

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Abstract — The list of spp. of which male chromosome numbers are reported and brief descriptive notes on the karyotypic morphology provided includes *Calicnemia miniata* Sel. (2n = 25, n = 13, *m*) (Platycnemididae), *Anax guttatus* (Ramb.) (2n = 15, n = 8, *m*, XO) (Aeshnidae) and *Neurothemis intermedia degener* Sel. (n = 13, *m*) (Libellulidae), all of which are new for cytology. *A. guttatus* is cytologically the most aberrant member of the genus so far examined, and micrographs are shown of its principal divisional stages. *C. miniata* was found breeding on permanently wet rocks covered by forest litter and moss, without open water. This sp. and *Tholymis tillarga* (Fabr.) were not previously reported from Nepal.

Introduction

The following is the list of species collected April 18-30, 1979 in the Upper Arun Valley, Kosi Zone, eastern Nepal. *Calicnemia miniata*, *Anax guttatus* and *Neurothemis intermedia degener* are new for cytology. The first mentioned species and *Tholymis tillarga* were not recorded previously from the Nepalese territory; the others are listed here for the sake of distributional records only. All specimens were examined by Dr M.A. Lieftinck, Rhenen. The Feulgen slides and specimens

are/will be deposited in the authors' collection.

Annotated list

Platycnemididae — *Calicnemia miniata* Sel. (3 ♂, in a forest between the Irkua and Bokua Kholas, 550 m, Apr. 27). The habitat is wet, shady forest ground, without open water. Larvae were collected on permanently wet rocks, covered by organic litter, mud and moss. Teneral individuals and exuviae were also present at the time of our visit. — 2n = 25, n = 13, *m*-bivalent of similar or larger size than X at m I (cf. Fig. 1).

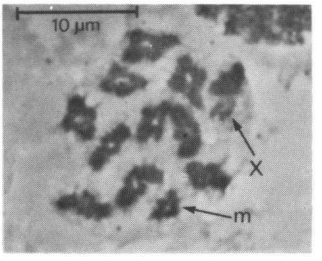


Fig. 1. Calicnemia miniata Sel., ♂ (Platycnemididae): primary spermatocyte metaphase.

NOTES: (1) At the moment of the preparation of this note, Dr M.A. Lieftinck has largely completed his taxonomic revision of the genus. For this purpose he has re-examined all of our previously published *Calicnemia* material from Nepal, and has informed us (Dec. 6, 1981) that the names of two taxa, published earlier by KIAUTA (1975), should be corrected. The correct name of "C. nipalica", listed in the said publication, p. 43 and pp. 72-73, fig. 1, is *C. pulverulans* Sel., while the material identified as "Calicnemia sp." (p. 43 and pp. 72-73, fig. 3) is pertaining to an undescribed species. – (2) It should be emphasized here, as is also apparent from the above mentioned fig. 3, that the karyotype of the new species is significantly different from all other so far known *Calicnemia* karyotypes. At variance with other *Calicnemia* taxa, the metaphase-I elements in the new species, including the univalent sex chromosome, are almost uniform is size. In all other examined members of the genus the size gradation is more or less pronounced, and the sex element is always the smallest of the set, or, at most, equal to *m* at primary spermatocyte metaphase. — (3) It is perhaps worthwhile to mention that we have found *C. miniata* breeding in a similar habitat also at Kodari, on the Nepal-Tibet frontier (1700 m, June 4, 1973), where it is accompanied by *C. eximia* Sel. and by the above mentioned undescribed species. The latter two species breed also in waterfalls, but differ in this respect from *C. pulverulans*, which we have always collected in rapid streams of the Kathmandu Valley (Godavari) only.

Coenagrionidae — *Ceriagrion coromandelianum* (Fabr.) (2 ♂, Katikyegat, right bank of Arun, North of Tumlingtar, 425 m, Apr. 28). — n = 14. The smallest bivalent at m I hardly recognizable as an *m*, and equal in size to X.

Chlorocyphidae — The general karyotypic features of the three species listed below are identical, viz. n = 12, *m*; at m I, one bivalent distinctly large.

Rhinocypha quadrimaculata Sel. (1 ♂, Dingla area, right bank of Arun, 445 m, Apr. 29). — There are no n = 13 complements in the specimen examined (cf. KIAUTA, 1975, p. 42). At m I, X the second smallest of the set, *m* minute.

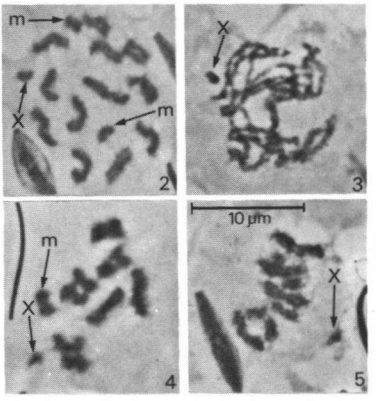
R. trifasciata Sel. (2 ♂, Sanghua Khola, Japhu-Bumling track, 600 m, Apr. 26). — At m I, *m* and X significantly larger than in the preceding species; the former in many figures hardly distinguishable from the second smallest bivalent.

R. unimaculata Sel. (4 ♂, Dingla area, right bank of Arun, opposite Chauabesi, 445 m, Apr. 29; 1 ♂ Sanghua Khola, Japhu-Bumling track, 600 m, Apr. 26). – 2n = 23. At m I, *m* and X usually large. In some m-I figures there are 13 or more elements, due to precocious segregation of one or more of the medium-sized bivalents.

Euphaeidae – *Anisopleura comes* Sel. (1 ♂, Sanghua Khola, Japhu-Bumling track, 600 m, Apr. 26). – n = 13, *m*.

Calopterygidae – *Neurobasis c. chinensis* (L.) (2 ♂, Dingla area, right bank of Arun, opposite Chauabesi, 445 m, Apr. 29). – 2n = 23, n = 12, *m*.

Aeshnidae — *Anax guttatus* (Burm.) (1 ♂, Katikyegat, right bank of Arun, North of Tumlingtar, 425 m, Apr. 28). — 2n = 15, n = 8, *m*, XO. This is a secondary complement, originating in fusion 2-by-2 of the primary karyotype autosomes, leaving the *m*-elements and the X unaffected. Consequently, the pachytene and anaphase-II behaviour of the X is normal (cf. Figs 2-5). This is cytologically the most aberrant species yet encountered in the genus.



Figs 2-5. *Anax guttatus* (Ramb.), ♂ (Aeshnidae), principal stages of maturation divisions, showing the XO mode of sex determination in the secondary karyotype: (2) spermatogonial metaphase; — (3) pachytene; — (4) metaphase I; — (5) early anaphase II, lateral view.

Libellulidae — *Brachydiplax sobrina* (Ramb.) (1 ♂, Katikyegat, right bank of Arun, North of Tumlingtar, 425 m, Apr. 28). — 2n = 25, n = 13, *m*.

Crocothemis servilia (Dru.) (1 ♂, rice fields between Hile-Tumlingtar, left bank of Arun, 370 m, Apr. 14). — n = 13, *m*.

Diplacodes nebulosa (Fabr.). (2 ♂, rice fields between Hile-Tumlingtar, left bank of Arun, 370 m, Apr. 18). n = 13, *m* (large at m I).

Neurothemis intermedia degener Sel. (1 ♂, Tumlingtar, 400 m, Apr. 30). — n = 13, *m*.

Orthetrum luzonicum Br. (1 ♂, Japhu, 680 m, Apr. 25) — 2n = 25, n = 13, *m*. At m I, X is the second smallest of the set.

O. pruinosum neglectum (Ramb.) (1 ♂, Japhu-Bumling track, 600 m, Apr. 26). — n = 13, *m*.

Tholymis tillarga (Fabr.) (2 ♂, Katikyegat, right bank of Arun, North of Tumlingtar, 425 m, Apr. 28). — 2n = 25, n = 13, *m* (minute).

Tramea basilaris burmeisteri Kirby (2 ♂, Katikyegat, right bank of Arun, north of Tumlingtar, 425 m, Apr. 28). — n = 13, *m* (at m I similar in size to X).

Reference — KIAUTA, B., 1975. *Cytotaxonomy of dragonflies with special reference to the Nepalese fauna.* Nepal Research Center, Kathmandu.

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