TWO CYTOTAXONOMICALLY INTERESTING CASES OF IRREVERSIBLE AUTOSOME FUSION IN DRAGONFLIES: *ARGIA MOESTA* (HAGEN) (ZYGOPTERA: COENAGRIONIDAE) AND *ANACIAESCHNA ISOSCELES* (MÜLLER) (ANISOPTERA: AESHNIDAE)

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Abstract *A. moesta* (London, Ontario, Canada; 2n ♂ = 25, n ♂ = 13, XO) is the first out of about 60 cytologically examined coenagrionide spp. the chromosome number of which deviates from the usual family pattern (27, 14 resp.). Its karyotype agrees with those of the other 5 hitherto studied *Argia* spp. in lacking the *m*-chromosomes, and is characterized by an exceptionally large autosome pair (bivalent). – *A. isosceles* (Utrecht, Netherlands; 2n ♂ = 25, n ♂ = 13, *m*, XO) is the first out of 8 anactine spp. studied possessing this complement. – Micrographs of spermatogonial and spermatocyte I metaphase are provided.

Introduction

The family type number of 14 is met with in dragonflies only in Protoneuridae, Coenagrionidae and Aeshnidae. No lower chromosome numbers have been ever reported in the two zygopteran families, while a secondary reduction has taken place in a few aeshnide species, pertaining to various subfamilies. The phenomenon is due to fusion of one or more elements of the primary karyotype, and may be peculiar for a species throughout its range, or it is limited to some of its populations only. The fusion may be permanent or reversible. In the latter case primary and secondary complements may occur in one and the same individual.

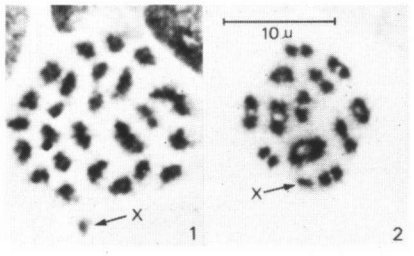
The common feature of the two species dealt with here lies in the deviation of their chromosome numbers from the usual family pattern. Out of about 60 cytologically studied coenagrionide species, *Argia moesta* is the first one possessing a chromosome number lower than the family type number. Likewise in the Anactinae, *Anaciaeschna isosceles* has a peculiar chromosome number. It is therefore worthwhile to record briefly the cytology of the two species.

Of each species only a single adult male has been available for examination. The specimens and (Feulgen) slides are kept in the collection of the Department of Animal Cytogenetics and Cytotaxonomy, University of Utrecht.

Argia moesta (Hagen)

Thames River, London, Ontario, Canada; August 11, 1977; B. Kiauta, J.M. van Brink, J.W. Boyes leg.

This is the sixth cytologically examined member of the genus. At variance with the other five species, viz. *fumipennis* (Burm.), *funebris* (Hag.), *sedula* (Hag.), *violacea* (Hag.), and *vivida* Hag. (for references cf. KIAUTA & VAN BRINK, 1978), which all possess male complements of 2n = 27, n = 14, in *A. moesta* there are but 25 elements at spermatogonial metaphase and 13 in primary spermatocytes. The fusion of two original autosome pairs (bivalents) appears permanent, and resulted in the occurrence of a huge pair (bivalent), considerably larger than the others. Like in the other *Argia* species the *m*-chromosomes are lacking, and the X is one of the small elements at spermatogonial metaphase (Fig. 1), and by far the smallest of the set at metaphase I (Fig. 2).



Figs. 1-2. *Argia moesta* (Hagen) (Feulgen squash, 1500 X): (1) spermatogonial metaphase; – (2) primary spermatocyte metaphase. Note the extra large pair (bivalent).

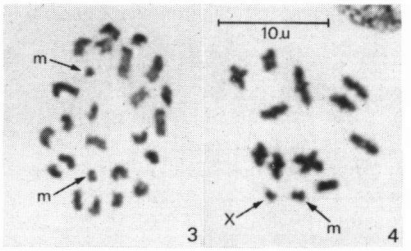
Contrary to the situation in Pseudagrionidae (and perhaps also in Amphicneminae), in the Coenagrioninae, Ischnurinae, Agriocneminae and Argiinae the *m*-elements but seldom occur. In those genera of the latter four subfamilies of which a representative sample of species has been studied, they are completely lacking only in (the primary complements of) *Enallagma* and in *Argia* (cf. KIAUTA, 1972).

Anaciaeschna isosceles (Müller)

Utrecht, the Netherlands; July 12, 1977; G.A. Boon von Ochssée, A.B. van Woerkom leg.

This is the eighth anactine species studied cytologically (for references cf. KIAUTA, 1972, 1975). Save for *Hemianax ephippiger* (Burm.), in which most elements are fused (n = 7), and the mode of sex determination is probably of the neo-XY type, the six other species all possess haploid complements of 14 elements, one of which is an *m*-bivalent. *A. isosceles* is, thus, the first known member of the subfamily in which fusion of two autosome pairs (bivalents) has taken place, giving rise to the secondary male complement, 2n = 25, n = 13, including an *m*-pair (bivalent). The fusion is permanent, but no element appears extra large, though the largest of them can be easily discerned in all figures. The X is medium sized at spermatogonial metaphase (Fig. 3), while it has about the same volume as the *m*-bivalent at metaphase I (Fig. 4).

In the Aeshninae several species are known in which fusion of the autosomes of two pairs or of one autosome and the X has taken place, giving rise to an extra large pair (bivalent) or to the neo-XY mode of sex determination, and reducing the chromosome number to 25 (13). In many, though not in all of these, the process appears reversible, and the 27 (14) complements



Figs. 3-4. (Müller) (Feulgen squash, 1500 X): (3) spermatogonial metaphase; – (4) primary spermatocyte metaphase.

are often found along with the 25 (13) sets in one and the same individual. In the gomphaeschnine *Basiaeschna janata* (Say) 13 elements have been reported by CRUDEN (1968), without a comment on the origin of the complement. It seems, thus, that the reduction of the chromosome numbers of the original 2n ♂ = 27, n ♂ = 13 karyotypes is a general phenomenon in the family, and that it is not peculiar on the subfamily level.

References – CRUDEN, R.W., 1968, *Can. J. Genet. Cytol.* 10: 200-214; – KIAUTA, B., 1972, *Odonatologica* 1: 73-102; – 1975, *Cytotaxonomy of dragonflies, with special reference to the Nepalese fauna*, Nepal Research Center, Kathmandu; – KIAUTA, B. & J.M. VAN BRINK, 1978, *Odonatologica* 7: 15-25.

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