

THE CHROMOSOME NUMBERS OF ELEVEN DRAGONFLY SPECIES FROM SINGAPORE

During a prolonged stopover on the way to the XVIth International Congress of Entomology (Kyoto, Japan), we had time, on July 22, 1980, for some casual dragonfly collecting in Singapore. The collection is of no faunistic interest (cf. M.A. LIEFTINCK, 1954, *Treubia* (Suppl.) 22: XIV+202 pp.), but it contains six

known. This is also the case of *Orthetrum t. testaceum*, gathered along with the five other species mentioned below (incl. a population of *N. fluctuans*) at the Central Park. The following are brief notes on the male karyotypes of the 11 taxa.

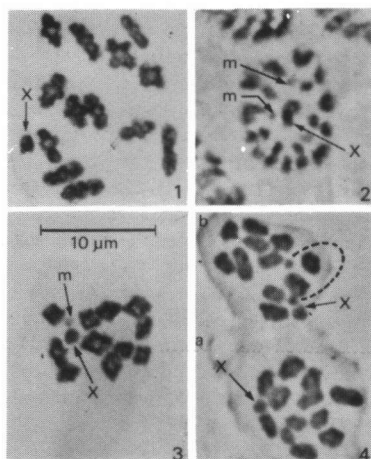
Ceriatrion cerinorubellum (Brauer) — $n=14$; the relatively large X is the smallest element of the set at I m, there are no *m*-chromosomes in the two specimens examined. This is at variance with the situation reported from Ballygunge (Calcutta), India (J. DASGUPTA, 1957, *Proc.zool.Soc. Calcutta* 10: 1-66) where, in addition to a small X, the occurrence of a pair (bivalent) of minute *m*-elements was reported and figured.

Ictinogomphus decoratus melaenops (Selys & Hagen) — $2n=23$, $n=12$, *m*. At M m, the X is by far the largest of the set, at I m, it is the fourth largest element, seven bivalents are medium-sized, and the *m*-bivalent is small. The spermatocyte prophase figures show a large heterocyclic element, in addition to a heteropycnotic section in one of the autosome bivalents. At anaphase II, the sex element forms an "accessory plate", but does not precede the dividing autosomes.

Aethriamanta gracilis (Brauer) — $2n=25$, $n=13$, *m*. At I m, the bivalents are very gradually decreasing in magnitude, save for an extremely minute *m*. The X is only slightly inferior in size to the smallest "normal" bivalent at this stage.

Crocothemis servilia (Drury) — $2n=25$, $n=13$, *m*. At I m, the X and *m* are small and similar in size, the *m*-bivalent being the smallest of the set.

Neurothemis fluctuans (Fabricius) — $2n=25$, $n=13$. The species is well known for its extraordinary morphological variation, particularly in the size of individuals within a population. At the pool in the Central Park, the majority of individuals are small, but the majority of those at the MacRitchie Reservoir are large. We have examined the complements of 10 individuals; these do not show significant differences, but the species seems to be characterized by precocious segregation of one of the medium-sized bivalents, occurring in some 10% of the I m figures. This could point to a certain degree of genetic instability, and to a



Figs. 1-4. Chromosomes in spermatogenesis of: (1) *Ceriatrion cerinorubellum* (Brauer), early metaphase I (note the absence of an *m*-bivalent); — (2) *Ictinogomphus decoratus melaenops* (Sel. & Hag.), spermatogonial metaphase; — (3) *Aethriamanta gracilis* (Brauer), early metaphase I; — (4) *Neurothemis fluctuans* (Fabr.), metaphase I: (a) polar view of a "normal" plate, — (b) plate showing a precociously segregated bivalent. — Feulgen squash, 1500 X.

species that were not previously examined cytologically, while the karyotype of one species appears significantly different from earlier evidence on record. *Ictinogomphus decoratus melaenops*, *Aethriamanta gracilis*, *Neurothemis fluctuans*, *Rhodothemis rufa* and *Rhyothemis triangularis* were collected at the MacRitchie Reservoir. The chromosome complements of all of these were hitherto un-

phylogenetically young age of this species. The I m, elements are of gradually decreasing magnitude; one bivalent is slightly, but distinctly larger than the others, and the X and m are large, but similar in size.

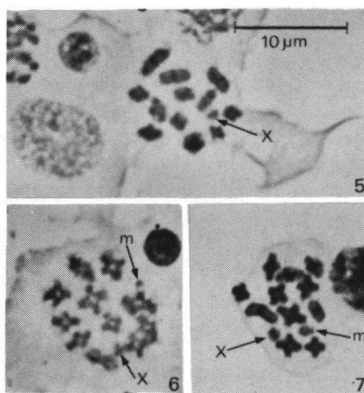
Orithetrum sabina (Drury) — $n=13$, m.

O. t. testaceum (Burmeister) — $2n=25$, $n=13$.

Pantala flavescens (Fabricius) — $n=13$, m (at I m minute).

Rhodithemis rufa (Rambur) — $2n=25$, $n=13$, m. While the minute X can be readily discerned in all figures, the m-pair (bivalent) is

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Figs. 5-7. Primary spermatocyte chromosomes of: (5) (Bur.), metaphase I; — (6) (Ramb.), late diakinesis; — (7) Kirby, late metaphase I. — Feulgen squash, 1500 X.

so tiny and weakly stained that it can easily escape notice, the more so, as at I m it is often (at least optically) terminally associated with one of the other bivalents. The latter are but slightly graded.

Rhyothemis triangularis Kirby — $n=13$, m. At I m, the X and m are almost identic in size and rather large. The largest bivalent is discernible, but the others are hardly graded in size.

Trithemis aurora (Burmeister) — $n=13$, m.

All specimens were examined by Dr. M.A. LIEFTINCK (Rhenen) and are deposited, along with the Feulgen squash preparations, in the collection of the authors.

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