

NOTES ON THE MALE GERM CELL KARYOTYPES OF SOME ODONATA FROM THE SHANXI PROVINCE, CHINA

The present note describes karyotypic features of 15 species, the 7 asterisked (*) are new to cytology. The lacto-acetic-orcein squashes were photographed with an Olympus photomicroscope (BHS/BHT, PM-10AD), using Chinese panchromatic films (magnification on negative 268 X). The specimens are deposited in the Collections of the Department of Biology, University of Shanxi, Taiyuan, China.

If not stated otherwise, the karyotype morphology agrees with the evidence recorded in the literature.

Coenagrionidae — *Cercion barbatum* (Needham)* (5 ♂, Yin-shan Lake, Xing-Xian Co., 6-VIII-1982). — $n\delta = 14$, m (Fig. 3). At metaphase I, the X is the smallest of the set. The bivalents are of gradually decreasing magnitude.*

C. hieroglyphicum (Br.) (1 ♂, Nian-Zi-Guan, 30-VII-1982). — $n\delta = 14$, m (Figs 1-2). At metaphase I, the unpaired X and the m -bivalent are similar in size.

Ischnura elegans (Vander L.) (8 ♂, Nian-Zi-Guan, 25-VIII-1982). — $n\delta = 14$.

I. lobata Needham* (5 ♂, Nian-Zi-Guan, 25-VIII-1982). — $n\delta = 14$ (Figs 4-9). There are no m -elements. At metaphase I, the bivalents are of gradually decreasing magnitude, save for a large sex-element. Sex determination is of the neo-XY mode. In this feature the species essentially differs from all other hitherto studied members of the genus.

Calopterygidae — *Calopteryx atrata* Sel. (4 ♂, Nian-Zi-Guan, 25-VIII-1982). — $n\delta = 13$, m .

Gomphidae — *Ophiogomphus spinicorne* Sel.* (6 ♂, To-Lo-Shan, Xing-Xian Co., 5-VIII-1982). — $n\delta = 12$, m (Figs 10-11). At metaphase I, the elements are of gradually decreasing magnitude, save for a huge sex-element and for a small m -bivalent. The chromosome cytology of 5 other congeners has been recorded earlier, but the occurrence of the m -elements in a member of this genus is reported here for the first time.

Aeshnidae — *Anax parthenope julius* Br. (7 ♂, Jin-Yan Lake, Taiyuan, 22-VI-1982). — $n\delta = 14$, m (Fig. 13).

Cordulegastridae — *Anotogaster sieboldii kuchenbeiseri* Foerster* (4 ♂, To-Lo-Shan, Xing-Xian Co., 5-VIII-1982). — $n\delta = 13$ (Fig. 12). At metaphase I, the bivalents are gradually decreasing in magnitude and the X is the smallest of the set. Striking is the absence of the m -pair, which does occur in the Japanese nominate form (cf. K. OGUMA, 1930, *J. Fac. Sci. Hokkaido Univ.*, VI, 1: 1-32; — B. KIAUTA & M. KIAUTA, 1984, *Odonatologica* 13: 484-485, OA 4492). This is, thus another case of karyotypic distinction between the Continental and the Japanese infraspecific taxa.

Libellulidae — *Orithetrum albistylum speciosum* Uhler (4 ♂, Bei-Zhang Village, Taiyuan, 23-VIII-1982). — $n\delta = 13$, m . The karyotypic morphology is identical to that reported in the Japanese material.

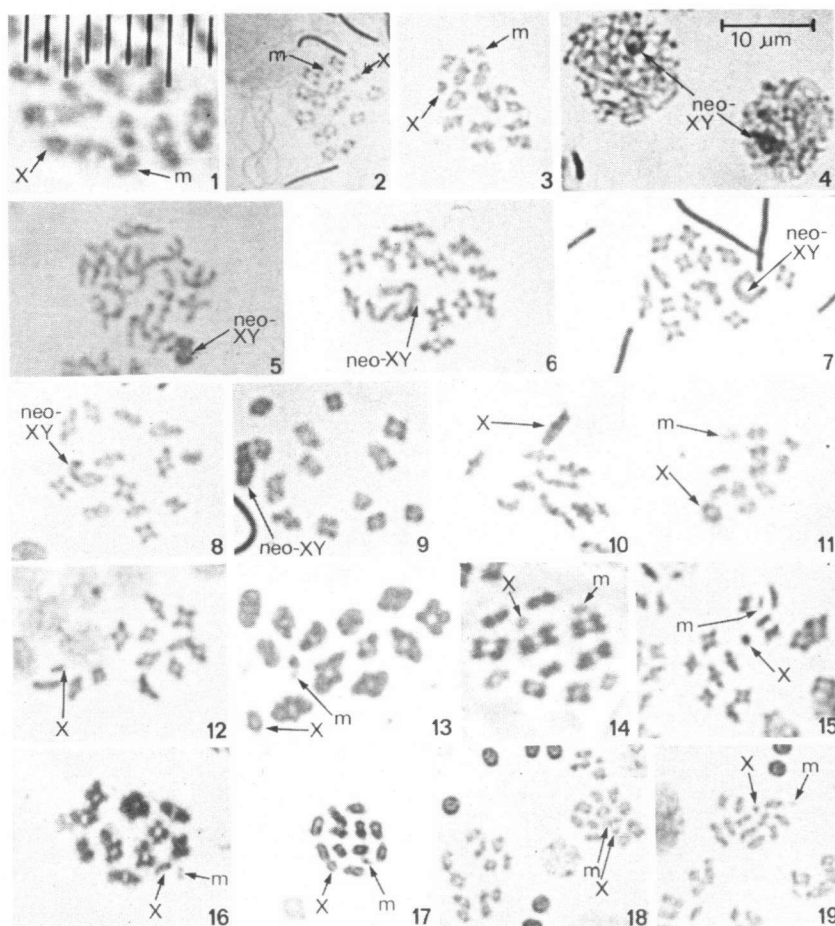
O. b. brunneum (Fonsc.) (4 ♂, To-Lo-Shan, Xing-Xian Co., 5-VIII-1982). $n\delta = 13$, m . The karyotypic morphology is identical to that reported from Italy.

O. lineostigma (Sel.)* (7 ♂, Nian-Zi-Guan, 20-VII-1982). — $n\delta = 13$, m (Fig. 14). At metaphase I, the X and the m -bivalent are almost equal in size; various size-classes can be easily discerned in the other bivalents at this stage.

Pantala flavescens (Fabr.) (5 ♂, Nian-Zi-Guan, 30-VII-1982). — $n\delta = 13$, m .

Sympetrum fonscolombi (Sel.)* (2 ♂, Er-Lon-Shan, Shan-Lan Village, 18-VIII-1982 (Fig. 15). — $n\delta = 13$, m . At metaphase I, the m is the smallest of the set, the X being almost twice as large.

S. depressiusculum (Sel.) (5 ♂, Shan-Lan Village, Taiyuan, 18-VIII-1982; 6 ♂, Bei-Zhang Village, Taiyuan, 5-VIII-1985). — $2n\delta = 25$, $n\delta = 13$, m , XO (Figs 16-17). Inspired by the brief note of B. KIAUTA & M. KIAUTA (1984,



Figs 1-19. Spermatocyte chromosomes of some Shanxi dragonflies (lacto-acetic-orcein squash; magnification indicated in Fig. 4.), various stages of late diakinesis and metaphase I, unless stated otherwise: (1-2) *Cercion hieroglyphicum* (Br.); — (3) *C. barbatum* (Needham); — (4-9) *Ischnura lobata* Needham (4: early pachytene, — 5: early diakinesis, — 6-8: late diakinesis, — 9: metaphase I); — (10-11) *Ophiogomphus spinicorne* Sel.; — (12) *Anotogaster sieboldii kuchenbeiseri* Foerster; — (13) *Anax parthenope julius* Br.; — (14) *Orthetrum lineostigma* (Sel.); — (15) *Sympetrum fonscolombei* (Sel.); — (16-17) *S. depressiusculum* (Sel.); — (18-19) *S. uniforme* (Sel.).

Notul. odonatol. 2: 66-67), we have examined the cytology of this species thoroughly and critically. The male haploid number is definitely 13, the *m*-bivalents are minute and weakly stained

in all primary and secondary spermatocyte metaphases, and our observations entirely agree with the evidence published by Kiauta & Kiauta.

S. uniforme (Sel.)* (2 ♂, Shan-Lan Village, Taiyuan, 23-VIII-1982). — $n\delta = 13$, m . (Figs 18-19). — At metaphase I, the sex element is minute, though still significantly superior in size to the extremely tiny m -bivalent.

In his review paper on the odonate fauna of the Shanxi Province, S. ASAHINA (1949, *Mushi* 20: 27-36, pls 1-2 excl.) listed 16 species. The following of the above are not included:

Cercion barbatum, *C. hieroglyphicum*, *Ischnura lobata*, *Calopteryx atrata*, *Anotogaster sieboldii kuchenbeiseri*, *Orthetrum lineostigma*, *Pantala flavescens*, *Sympetrum depressiusculum* and *S. uniforme*.

H.-q. Zhu and J.-l. Wu, Department of Biology, University of Shanxi, Taiyuan, Shanxi Province, China.