

Cytology and systematical position of Stylopids (= Strepsiptera)

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FERREIRA, A., CELLA, D. M., MESA, A. and VIRKKI, N. 1984. Cytology and systematical position of Stylopids (= Strepsiptera). — *Hereditas* 100: 51–52. Lund, Sweden. ISSN 0018-0661. Received April 19, 1983

Karyotype formula $3+Xy$ (or, probably, $3+neoXY$) was determined in a Brazilian Stylopid, *Brasixenos* near *occidentalis* Kogan & de Oliveira. Because of the sex chromosomes and other Coleopterous characteristics of the spermatogenesis, we support the view that the Stylopids are Coleopterous rather than Hymenopterous insects.

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JEANNEL (1960) considers Stylopids (or Order Strepsiptera) as related to Hymenoptera, whereas most systematists relate them, with more or less hesitation, to Coleoptera (ARNETT 1968; BLACKWELDER 1945; BOUDREAUX 1979; CROWSON 1960; KRISTENSEN 1981).

HUGHES-SCHRADER (1924) made a meticulous study on the reproduction and cytology of one species, *Acroschismus wheeleri* Pierce. This Stylopid has a sex ratio nearly 1:1; a normal, reductional spermatogenesis, $2n=16$ chromosomes, and 8 bivalents at M I of both sexes. All chromosomes are similar, rounded dots.

Apparently due to the difficulty in obtaining properly timed and identified chromosome material, over half a century passed before the next Stylopid spermatogenesis was checked. In the surroundings of Rio Claro, in the Brazilian State São Paulo, colonies of the wasp *Polybia occidentalis* become occasionally infested by a Stylopid, *Brasixenos* near *occidentalis* Kogan & de Oliveira. With help of our hymenopterist colleagues, we localized a heavily infested colony in 1980, and, after a long trying, finally encountered three pupae of the Stylopid in the proper phase of spermatogenesis.

Material and methods

Male pupae nearing eclosion become wedged in between the abdominal segments of the host. The presence of such pupae can be either seen, or inferred from a slight deformation of the abdomen. Such pupae were excised, fixed for 1 h in 1:3 acetic ethanol, and tapped on a clean slide. After drying, the preparations were stained with lacto-acetic orcein for 1 h. Zeiss Photomicroscope II and Kodak High Contrast Copy film served for photography. Prints were made on Kodabrome II RC H paper.

Results and conclusions

Spermatogonia were not encountered. The spermatogenesis seems to progress as one big wave, and our specimens had reached the meiotic divisions.

The number of bivalents at M I is only four: One large, often ringformed one, and three dumb-bell shaped ones (Fig. 1). All can be distinguished from one another. The penultimate in size is slightly

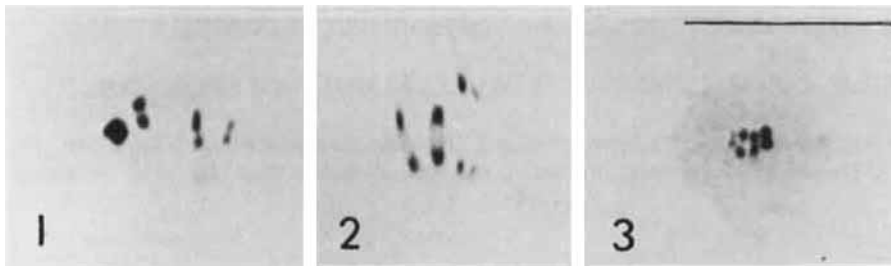


Fig. 1-3. Male meiosis of *Brasixenos* near *occidentalis*. The sex bivalent or chromosome is the second one from the right in all plates. 1 M I. 2 A I. 3 M II with X chromosome. Bar: 10 μ m.

heteromorphic and could be the sex bivalent: Xy, or, perhaps, neoXY. The association of all bivalents is most probably by chiasmata. The karyotype formula is thus 3+Xy (or 3+neoXY).

The first meiotic division is reductional (Fig. 2). Chromosomes of M II stand in the spindle like the bivalents of M I (Fig. 3). We believe that this is due to *distal collochores* as found in Lampyrid, Pyrophorine, Chrysomelid (SMITH and VIRKKI 1978; VIRKKI 1983a, b) and Bembidiine (SERRANO 1981) beetles. The cellular and chromosomal size distinguishes M II from M I. In addition, the M II plates are of two kinds: those with X (Fig. 3) and those with y chromosome.

The extreme numerical reduction, and individually recognizable chromosomes, distinguish this new Stylopoid karyotype from that of *Acroschismus wheeleri*. Similar lines of evolution have polyphyletically taken place in the beetles, leading to 3+XY karyotypes in *Graphipterus serratus* (Carabidae) (WAHRMAN 1966) and *Homoschema nigriventris* (Chrysomelidae) (VIRKKI and PURCELL 1965), and even beyond that in the Pyrophorine Elaterid *Chalcolepidius zonatus*: 1+XY (FERREIRA et al. 1982). Repeated centric fusions *cum* pericentric inversions might have led to such extreme karyotypes (VIRKKI 1983b).

The spermatogenesis of the present *Brasixenos* species could very well be Coleopterian. Its sex is determined by a sex chromosome system. As signs of haplodiploidy have not been found in any of the two species studied up to now, we conclude that cytology supports the view that Stylopids are Coleopterous rather than Hymenopterous insects.

Acknowledgement. — Virkki gratefully acknowledges support received from the following institutions: Fundação de Amparo à Pesquisa do Estado de São Paulo (a grant), Universidade Estadual Paulista "Júlio de Mesquita Filho", Rio Claro (visiting professorship), and University of Puerto Rico (sabbatical year 1980-81).

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