

SHORT COMMUNICATION

# Karyotype of a termitophilic species of Diplopoda (Polydesmida, Chelodesmidae)

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## ABSTRACT

This report describes the karyotype of a Brazilian Diplopod species (Arthropoda), *Sandalodesmus gasparae* (Schubart, *Acta Zool. Lilloana Inst. "Miguel Lillo"* 2: 321-440, 1944), collected from a termite mound *Cornitermes bequaerti*. This species has  $2n = 12$ . The sex pair could not be distinguished.

## INTRODUCTION

Few studies are available on the cytogenetics of diplopods (approximately 64 species with a catalogued chromosome number) in relation to the species described (approximately 10,500). This is due in part to the complexity of systematics and to the small number of taxonomists working on this group, and in part to the technical difficulties in the analysis of diplopod chromosomes. In general, these chromosomes are small and tend to clump together. No tissue is available from which to obtain mitotic chromosomes, so that cytogenetic studies are limited to meiosis in males and to sporadic spermatogonial mitoses.

Cytogenetics studies in diplopods are interesting due to the low vagility of these animals, which can favor speciation, although White (1979) already commented that diplopods are conservative regarding karyotype evolution in general.

Most of the cytogenetics studies in diplopods concern species from India, i.e., belonging to the Oriental Zoogeographic Region (Achar, 1983a,b, 1984a,b, 1985, 1986, 1987; Chowdaiah, 1966a,b,c, 1967, 1969; Chowdaiah and Kanaka, 1969, 1974, 1979). The only paper published on species from the Neotropics

involves two Brazilian Spirostreptidae species (Fontanetti, 1991). Other studies are in Fontanetti (1987, 1992).

## MATERIAL AND METHODS

Five male specimens of *Sandalodesmus gasparae* were analyzed. The insects were collected in Mato Grosso do Sul, 34 km northeast of Dourados, from the air chamber of a mound of the termite *Cornitermes bequaerti*, by A. Mesa and V.G. Martins in August 1986. This Diplopod species was first described by Schubart in 1944 as belonging to the genus *Leptodesmus*, occurring in early spring in the region of Pirassununga, State of São Paulo.

Testicular vesicles of adult males were used for cytogenetic analysis. The material was treated with hypotonic 0.45% KCl and fixed by the method of Imai *et al.* (1977), with slight modifications. Slides were dried on a hot metal plate and stained with 1% lactoacetic orcein.

## RESULTS AND DISCUSSION

The species presents  $2n = 12$  and the sex pair could not be distinguished. Early prophase is marked

by a bouquet formation (Figure 1a), with part of the nucleus becoming diffuse and part continuing to be condensed thereafter (Figure 1b). The prophase of this species follows the pattern proposed by Fontanetti (1990): leptotene presents a configuration similar to the bouquet formation, with part of the polarized material being quite condensed and part almost totally decondensed (Figure 1a). At zygotene, the two different states of chromosome condensation are well visible (Figure 1b), with homologue pairing occurring in the less condensed portion. At pachytene the chromosomes still show different states of condensation and are arranged in the typical bouquet formation. After this phase, part of the nuclear chromatin is condensed and in most cases it is possible to count the chromosome number of the species and to observe part of the chromatin in a diffuse state. Diplotene (Figure 1c) also shows part of the chromosomes more condensed than others. The chromosomes are highly condensed at metaphase

I (Figure 1d,e), often looking like small chromatin clusters (Figure 1e) joining one another. This clumping has also been observed by other investigators in other species (Chowdaiah and Kanaka, 1969, 1974). A pair differing from the remaining ones is observed (arrows in Figure 1g,h and pair 3 in Figure 1i) which presents one of the ends stained as in the remaining chromosomes in the complement, with a broad lighter band in the rest of the element. This could be the NOR-bearing chromosome. It would therefore present this lighter portion since, when disorganization of the nucleolus occurs there may not be sufficient time for complete condensation of the chromosome regions associated with it. Consequently these regions would be visualized in metaphases as secondary constriction regions (Farah, 1982).

The spermatozoa (Figure 1f) were immobile, which is common for this group.

It is difficult to define the morphology of *S. gasparae* chromosomes (Figure 1i).

Pair 1 may be a submetacentric, pairs 2 and 4 metacentrics and pairs 3, 5 and 6 acrocentrics. Pair 3 is suspected to be the sex pair because of its heteromorphism compared to the other chromosomes, but no definite statement can be made. The XY sex determining mechanism is the most frequently found in the group. The sex pair is difficult to distinguish from the remaining pairs due to slight or no difference between X and Y. Achar (1983a), while studying *Spirostreptus asthenes* Pocock, commented that the sex determination mechanism of the Diplopoda is in a primitive state, as in the majority of species the sexual chromosomes are little differentiated from the autosomes. In the Diplopod species studied up to now the heteromorphic nature of this pair could not be proved by meiotic chromosomes alone. In fact, no female chromosome (which

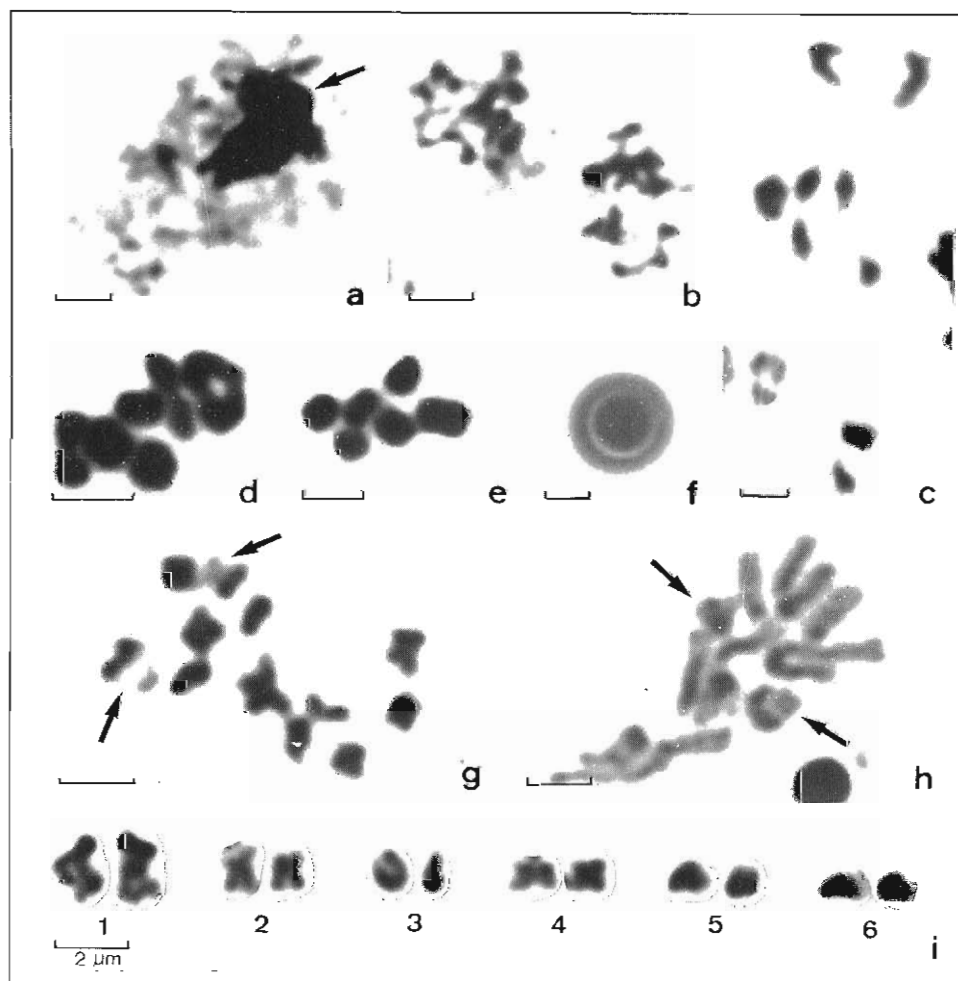


Figure 1 - a, Bouquet formation (arrow indicating polarized material); b, prophase nuclei showing the nucleus partly condensed and partly diffuse; c, diplotene; d, e, metaphases I; f, spermatozoon; g, late anaphase I, early metaphase II; h, spermatogonial metaphase (arrows indicating a heteromorphic pair); i, karyotype.

proves the XY mechanism) has been observed up to now, because of difficulties in making chromosome preparations (Achar, 1983a; Fontanetti, 1991).

The diploid number in the species already studied is quite variable, from  $2n = 8(?)$  to  $2n = 30$ . The chromosome number  $2n = 12$ , found in *S. gasparae*, has also been reported in another Brazilian species of diplopod, *Gymnostreptus olivaceus*, belonging to the Spirostreptidae family (Order Spirostreptida) (Fontanetti, 1991).

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## RESUMO

É apresentado o cariótipo de uma espécie de Diplopoda (Arthropoda), *Sandalodesmus gasparae* (Schubart, *Acta Zool. Lilloana Inst. "Miguel Lillo" 2*: 321-440, 1944), coletada em um cupinzeiro da espécie *Cornitermes bequaerti*. A espécie apresenta  $2n = 12$ , não podendo se distinguir o par sexual.

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