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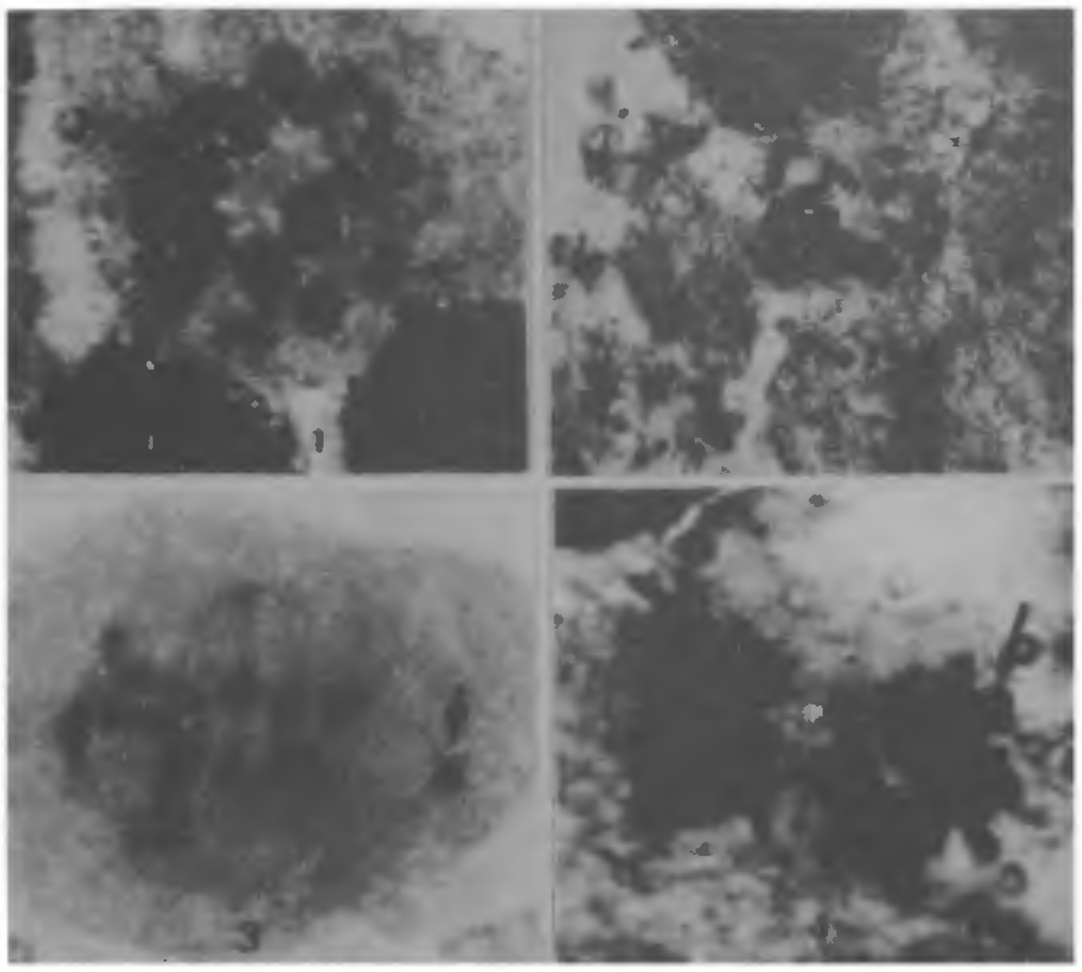
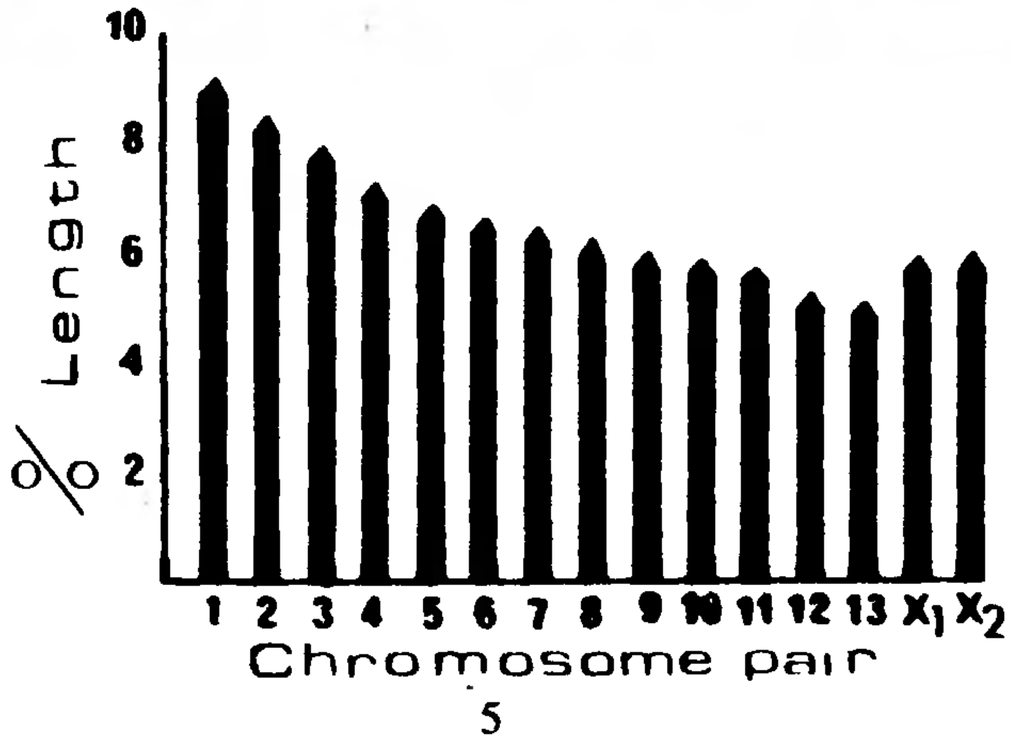
STUDIES ON SPERMATOCYTIC CHROMOSOMES OF AN AQUATIC WOLF SPIDER, *HIPPASA MADHUAE* TIKADER AND MALHOTRA (LYCOSIDAE: ARANEAE)

B. B. PARIDA, P. K. MOHANTY, P. SAHOO and A. MOHAPATRA
Department of Zoology, Utkal University, Bhubaneswar 751 004, India.

CONSIDERABLE work has been done on terrestrial spiders[1–7]. However, data on the chromosomal survey of the aquatic wolf spider belonging to the family Lycosidae (order Araneae of Arachnida) are quite scanty. The present study reports the behaviour of spermatocytic chromosomes of *Hippasa madhuae*. Sub-adult male spiders (15) collected from weeds grown in the canals of Bhubaneswar, Orissa (58° 53′ E longitude and 20° 21′ N latitude) constitute the material used for the investigation. Permanent chromosome preparations were made from squashed testes following Smith's technique[8].

The diploid chromosome number as determined from spermatogonial metaphase plate is 28. All the chromosomes are acrocentric and the bivalents are scattered throughout the nuclear area (figures 1 and 2). The metrical analyses of spermatogonial chromosomes scored from ten well-spread metaphase plates were made (table 1) and the idogram (figure 5) was prepared on the basis of percentage length of each chromosome as calculated upon the total chromosome length (TCL). During early spermatocytic prophase two dark stained condensed chromatin structures representing the sex chromosomes are discernible. The positive heteropycnotic behaviour of the chromosomes is exhibited up to the diplotene stage. Out of 28 chromosomes, 26 are autosomes and two are sex chromosomes (X_1 and X_2). The multiple sex chromosomes lie very close to each other and from an accessory plate (figure 3). Chromosomes of anaphase I are however, comparatively larger than at metaphase (figure 4). During this stage the autosomes and sex chromosomes





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Figures 1–5. **1.** Late diakinesis. **2.** Metaphase I. **3.** Metaphase I with accesory plate showing sex chromosome complex. **4.** Anaphase I. **5.** Idiogram.

Table 1 *Mean length and percentage of haploid set of chromosomes of aquatic spider Hippasa madhuae*

Pair No.	Mean Length ± S.E. (μ)	Percentage
1	3.28 ± 0.04	9.18
2	3.04 ± 0.08	8.51
3	2.84 ± 0.02	7.95
4	2.66 ± 0.09	7.45
5	2.52 ± 0.10	7.05
6	2.42 ± 0.06	6.77
7	2.32 ± 0.07	6.49
8	2.27 ± 0.06	6.35
9	2.18 ± 0.05	6.10
10	2.11 ± 0.04	5.91
11	2.10 ± 0.03	5.88
12	1.85 ± 0.18	5.18
13	1.83 ± 0.18	5.12
X_1 (unpaired)	2.14 ± 0.03	5.99
X_2 (unpaired)	2.14 ± 0.03	5.99

appear to be V-shaped and rod-shaped respectively. The first division of anaphase is reductional and the two X chromosomes which behave as a unit, move together to the same pole. This results in two types of secondary spermatocyte metaphases → one with 15 (13 A + X_1X_2) and the other with 13 elements (13A) only. The second division of anaphase is equational.

The sex-determining mechanism is very interesting in aquatic spiders. The male shows X_1X_2O type of mechanism where the Xs are invariably acrocentric. These Xs show strong positive heteropycnosis during prophase stages of meiosis in the male. The orderly segregation of the Xs to the same pole is probably facilitated by the precocious polarization of the nucleus during the prophase stages of meiosis[9]. The proximal localization of chiasmata in spermatogenesis has imposed a major barrier to the establishment of centric fusions in spider phylogeny. Many species with acrocentric chromosomes have, however, undergone evolutionary decreases in chromosome number. In these, presumably centric fusion led to the production of metacentric elements which were later converted into acrocentrics by pericentric inversion. The pattern of chiasmata must have evolved as follows (proximal → distal → proximal localization)[10]. Since X_1X_2O mechanism has been found in the primitive families, there can be no doubt that it was the primitive sex-determining mechanism of the whole group, which has been handed down from Palaeozoic times[10].

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PATULIN TOXICOSIS IN CHICKS

H. DEVARAJ, R. ESTHER SUSEELA and NIRANJALI DEVARAJ
Department of Zoology, University of Madras, Madras 600 025, India.

PATULIN is a potent mycotoxin and is toxic to a wide range of biological systems including microorganisms, plants and animals[1]. Dietary intake of mycotoxins has been linked to the high incidence of liver diseases in Uganda and Thailand[2]. It has been reported that amino acid transport across intestinal membrane is inhibited in patulin toxicity[3]. The present investigation reports the effect of patulin on membrane bound total ATPase and Na^+–K^+ dependent ATPase in the kidney and the intestine of chicks. These enzymes are involved in the transport mechanisms.

Patulin was isolated from the contaminated bread according to Scott and Kennedy[4] and its purity assessed by the characteristic R_f value on thin layer chromatography and its characteristic UV absorption maxima in comparison with authentic sample[5]. Thirty (one day old) white leghorn chicks, obtained from the Tamil Nadu Poultry Research Station, Madras were divided into two equal groups. One group having 15 birds was fed orally with 100μg of isolated patulin, every 48 hr by intubation. The other group served as control. Both the groups were fed with commercial chick diet and water. At the end of the 15th dose, the birds were fasted overnight and killed by a blow on the head. Kidney and intestine were removed and the tissues were homogenized in tris-HCl buffer, pH 7.5 (0.01 M) at 4°C and ATP phosphohydrolase was assayed following the method of Hokin *et al* [6]. For the assay of total ATPase activity, the incubation medium in a total volume of 1.0 ml contained the following: 0.1 ml of buffer, 0.1 ml of NaCl solution, 0.1 ml of KCl solution, 0.1 ml of $MgCl_2$ solution and 0.1 ml of enzyme extract. This mixture was incubated at 37°C for 30 min with and without 0.1 ml of