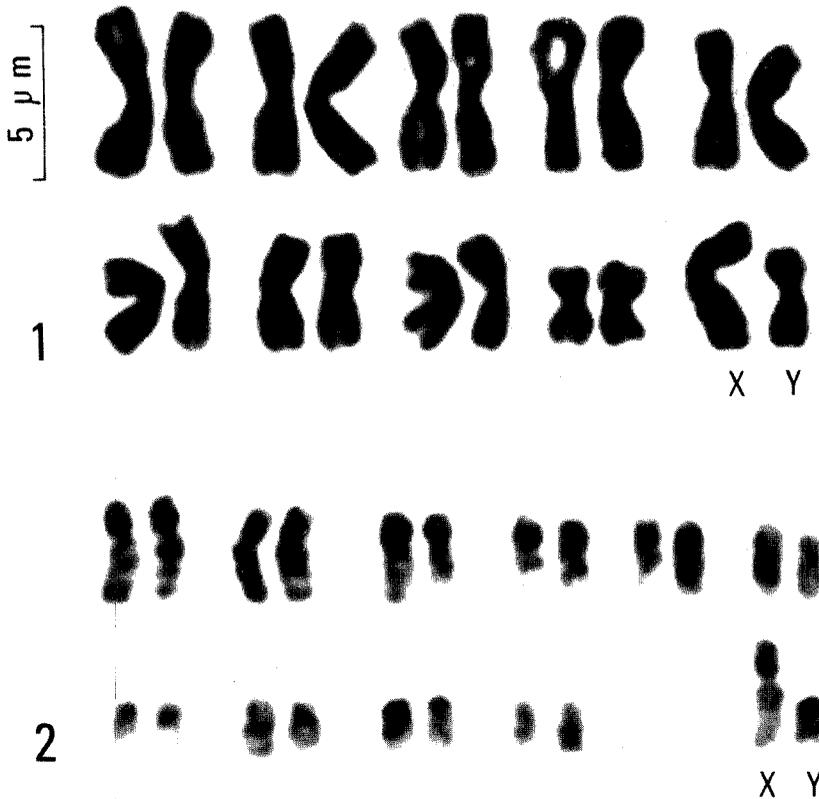


**CHROMOSOMES OF *LEIOBUNUM JAPONICUM JAPONICUM*
AND *LEIOBUNUM PAESSLERI* (ARACHNIDA, OPILIONES)**

The chromosomes of sixteen harvestmen of the genus *Leiobunum*, have been examined (Sokolow 1930, Parthasarathy and Goodnight 1958, Suzuki 1941, 1957, 1976a,b, Tsurusaki 1985). The early investigators used paraffin section and/or squash methods and usually were unable to make precise karyological analyses or to discriminate sex chromosomes. Recently air-drying techniques have become available and Tsurusaki (1982, 1985) has used them on several harvestmen with good results. In this note, we describe karyotypes of two species of *Leiobunum* that were successfully analyzed by the same method.

Leiobunum japonicum japonicum Müller: $2n$ (♂, ♀) = 20, NF = 40 (Fig. 1). Two juvenile specimens, one of each sex from Maruyama in Sapporo, Hokkaido, Japan were dissected on 16 July 1982. Six adult males from Mt. Kiyosumi, Chiba prefecture, Honshu were also prepared on 29 August 1984. The chromosome analysis was based on examination of 35 spermatogonial metaphase plates. There was one pair of heteromorphic chromosomes that consisted of a submetacentric similar in size to chromosomes 1-4 and a small metacentric similar in size to chromosome 8. We presume that this heteromorphic pair constitutes the sex



Figs. 1-2.—Male karyotypes of two species of *Leiobunum*: 1, *L. japonicum japonicum* ($2n = 20$); 2, *L. paessleri* ($2n = 22$).

chromosomes, and that the larger member of the pair is the X and the smaller the Y chromosome. The autosomes consisted of 9 pairs of metacentric chromosomes. Numerous first meiotic metaphases from adult males invariably showed 10 bivalents. No differences were detected between the males from the two locations. Unfortunately, no mitotic metaphase plates good enough for karyological analysis were obtained from the female. However, 20 chromosomes could be clearly counted from one ovarian follicle cell. The diploid chromosome number of $2n = 20$ was previously reported for the male of this species by Suzuki (1941).

Leiobunum paessleri Roewer: $2N$ (δ) = 22. $NF = 44$ (Fig. 2). Adult specimens were collected near Kuskonook, British Columbia, Canada on 19 October 1984 and stored at about 5°C until needed. One male was dissected on 22 February and three more on 14 May 1984. Based on an examination of 13 well spread spermatogonial metaphase plates, the diploid chromosome number was determined to be 22. The presumed X and Y chromosomes were, respectively, a large submetacentric, about the size of the largest autosomal chromosome, and the smallest metacentric. The autosomes consisted of 10 pairs of meta- or submetacentrics. Numerous first meiotic metaphases showed 11 bivalents without exception.

Sharma and Dutta (1959) first reported the existence of heteromorphic chromosomes in opilionids. Since then, Tsurusaki (1982, 1985, unpubl.) has distinguished X and Y chromosomes in *Paraumbogrella huzitai* as well as six species of the *Leiobunum curvipalpe*-group. Similarly, in males of the two species reported here, we distinguished a pair of heteromorphic chromosomes that probably correspond to the X and Y. These results further support the prediction of Tsurusaki (1982) that an XX-XY mechanism is the usual mode of sex-determination in opilionids.

All *Leiobunum* species thus far studied have diploid chromosome numbers between 16 and 26 (Sokolow 1930, Parthasarathy and Goodnight 1958, Suzuki 1941, 1957, 1976a, b, Tsurusaki 1985, unpubl.). In the two species considered here, where $2n = 20$ and 22, all the chromosomes were invariably found to be meta- or submetacentric, with no acrocentrics or telocentrics. This stability in chromosome structure has also been observed in almost all species of the *curvipalpe*-group (Tsurusaki 1985, unpubl.), in which the diploid number fluctuates widely from 18 to 26.

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LITERATURE CITED

- Parthasarathy, M. D. and C. J. Goodnight. 1958. The chromosomal patterns of some Opiliones (Arachnida). *Trans. Amer. Microsc. Soc.*, 77:353-364.
- Sharma, G. P. and G. P. Dutta. 1959. On the male heterogamety in *Melanopa unicolor* Roewer (Opiliones-Arachnida). *Res. Bull. (N.S.) Punjab Univ.*, 10:209-213.
- Sokolow, I. 1930. Untersuchungen über die Spermatogenese bei den Arachniden. IV. Über die Spermatogenese der Phalangiiden (Opiliones). *Z. Zellforsch. mikrosk. Anat.*, 10:164-194, T. 6-8.
- Suzuki, S. 1941. On the chromosomes of some opilionids. *Zool. Mag. (Tokyo)*, 53:101. (In Japanese).
- Suzuki, S. 1957. On the three closely related forms of the genus *Liobunum* (Phalangiidae, Opiliones). *J. Fac. Sci. Hokkaido Univ., Ser. VI, Zool.*, 13:109-117.

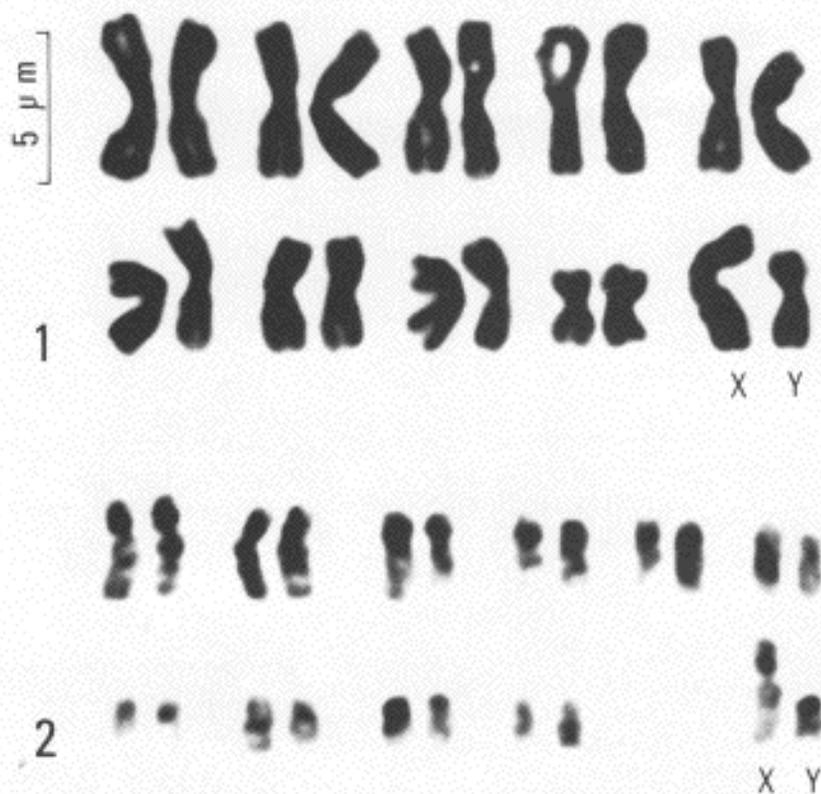
- Suzuki, S. 1976a. Cytotaxonomy in some species of the genus *Leiobunum* (Opiliones, Arachnida). Proc. Japan Acad., 52:134-136.
- Suzuki, S. 1976b. The genus *Leiobunum* C. L. Koch of Japan and adjacent countries (Leiobunidae, Opiliones, Arachnida). J. Sci. Hiroshima Univ., Ser. B, Div. 1, 26:187-260.
- Tsurusaki, N. 1982. Chromosomes of the Japanese gagrellid, *Paraumbogrella huzitai* Suzuki (Gagrellidae, Opiliones, Arachnida). Bull. British Arachnol. Soc., 5:397-398.
- Tsurusaki, N. 1985. Taxonomic revision of the *Leiobunum curvipalpe*-group (Arachnida, Opiliones, Phalangiiidae). I. *hikocola*-, *hiasai*-, *kohyai*-, and *platypenis*-subgroups. J. Fac. Sci., Hokkaido Univ., Ser. VI, Zool., 24:1-42.

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