**Inversion of a Centric Segment in a Chromosome of
Ichthyophis glutinosus (Linn)**

By

B. R. Seshachar

Department of Zoology, University of Mysore, Central College,
Bangalore

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In the course of my examination of sections of the testis of *Ichthyophis glutinosus* I came across a series which showed a change in their chromosome constitution. This variation was observed in all the nuclei and in all stages of spermatogenesis. As it is the first time such a variation was noticed in the chromosomes of *Ichthyophis*, I venture to present it in this short paper.

I have already reported (Seshachar, 1937a, 1937b) that the diploid chromosome number in *Ichthyophis glutinosus* is 42 and that of these, six chromosomes are large and form a conspicuous group on the metaphase plate of a spermatogonium. Four of these six are V-shaped in polar view and are almost identical. They form, during meiosis, two bivalents of large size with four chiasmata in each, in the final stage of condensation. The other two are long rods and they also form a compound bivalent in meiosis with four chiasmata. These three bivalents, two V-shaped and one rod-shaped, are very conspicuous and are most easily recognised in a polar view of the first metaphase plate (Fig. 1a). Their behaviour in meiosis is described in my paper on the subject (Seshachar, 1937b).

I observed during my examination of sections of the testis of this animal, one series, where, in the meiotic metaphase plate, a polar view disclosed the presence of three V-shaped bivalents instead of two V-shaped and one rod-shaped ones (Fig. 1b). On close examination it was noticed that:

- a. The number of bivalents had not undergone any change, i.e., it remained 21, the normal number.
- b. The change had affected only one of the large bivalents, i.e., the rod-shaped bivalent of the normal picture had become a V-shaped one.
- c. No change in size was observed so far as this or any other bivalent was concerned; only, the centromere, instead of being near one end, was now near the middle and was slightly submedian; the bivalent had unequal limbs.

Further, it was noticed that the polar views of Metaphase II revealed the same change. There was no rod-shaped chromosome seen on the normal plate but there was instead a V-shaped one with unequal limbs (Figs. 2a and 2b).

Figs. 1-2. *Ichthyophis glutinosus*. 1, polar view of first metaphase plate. $\times 3200$. 1a, a normal individual. A, rod-shaped bivalent. 1b, the abnormal individual. B, the changed bivalent. 2, polar view of second metaphase plate. $\times 3200$. 2a, a normal individual. 2b, the abnormal individual.

It was also observed that the change in regard to this chromosome was present in spermatogonia (both primary and secondary) and also in somatic cells (epithelial cells of the testis) where the large rod-shaped chromosomes were replaced by V-shaped ones.

All the above facts pointed to the conclusion that the change affecting the chromosomes of a pair (in a diploid group) was universally found in all the cells of the individual. The testis of *Ichthyophis* is in the form of a number of distinct lobes and the variation was observed in the cells of all the lobes.

It is clear therefore, that this individual is abnormal so far as its chromosome constitution is concerned and also that it is homozygous for the change. It follows that this change occurred a number

of generations back and a distinct population of *Ichthyophis* exhibiting this abnormality must therefore exist. I am unable to confirm this latter possibility on account of the fact that the animals were taken from Kottigehar, in the forest tracts of Mysore State, nearly 200 miles from Bangalore and were collected some years ago. When future collections are made from the area, I shall be in a position to report the correctness of the surmise.

The nature of the change itself can be assumed to be one of inversion of the centromere bearing segment of the AB. It is as shown below:

Fig. 3. Diagram to show the method of inversion of the centric segment.

Figs. 4a & 4b. Polar and side views of the changed bivalent at metaphase. $\times 5600$.

The change is also such that the centromere in the changed chromosome comes to be placed near the middle of the chromosome resulting in its assuming the shape of a V with unequal limbs.

In normal individuals during meiosis, the bivalent formed from the two rod-shaped chromosomes is such that it forms a series of three rings with four chiasmata of which two are terminal and two interstitial. The centromeres are placed on one of the terminal rings. The inversion of the centric segment has resulted in the formation of a V-shaped bivalent with unequal limbs and where the centromeres are placed on the middle ring.

If the above surmise proves correct, I believe this is the first instance where such a chromosomal change has been observed in a natural population.

References

- Seshachar, B. R. 1937a. The chromosomes of *Ichthyophis glutinosus* (Linn). *Cytologia* vol. 8. Nr. 2. p. 327.
 Seshachar, B. R. 1937b. The spermatogenesis of *Ichthyophis glutinosus* (Linn). II. The meiotic divisions. *Zeits. Zellf. Bd. 27, Heft 2.* p. 133.