7. *On the Chromosomes of Dendrolimus-Moths. I.*[1]

By Sajiro MAKINO.
Zoological Institute, Hokkaido Imperial University, Sapporo.
(Comm. by C. ISHIKAWA, M.I.A., Jan. 12, 1933.)

There are recorded from Hokkaido two different species of the genus *Dendrolimus* belonging to the family Lasiocampidae, *D. spectabilis* and *jezoensis*, both of which are found very abundantly at the same season in Sapporo. They seem to be allied, at first sight, but are distinguishable from each other not only in many taxonomical characters, as systematists show, but also in plants on which they feed. *D. spectabilis* Butl. is well known as the destroyer of the pine (*Pinus*), while *D. jezoensis* Mats. never attacks any kinds of *Pinus* but feeds on *Picea* and *Abies*. The present study has been undertaken with the expectation of learning whether there is any morphological difference between the chromosomes of these two related species or not.[2]

The material consists of testes from larvae of the fourth and fifth instars, obtained at the end of July, 1931. The testes were quickly dissected out, and transferred immediately to the fixing fluid. They are kidney-shaped and pale yellow in colour. For fixing reagent Meves' modification of Flemming's solution was used, as in the former study on *Oecanthus* (Makino, '32).[3] In fact, this fluid also proved good not only for the preservation of the chromosomes of all stages, but also for the demonstration of the central bodies and of the chondriosomes in the present case. Sections were cut in thickness more than 10 micra and stained with Heidenhain's iron haematoxylin.

1. *Dendrolimus spectabilis* Butl.

The spermatogonia are rather small and consequently the individual chromosomes are minute in size. In division the chromosomes form a flat equatorial plate and arrange themselves apart from each other

1) Contribution No. 43 from the Zoological Institute, Faculty of Science, Hokkaido Imperial University, Sapporo.

2) The study has been made under the direction of Prof. Oguma to whom the writer wishes to express his sincere gratitude.

3) Makino, S., 1932: Jour. Fac. Sci. Hokkaido Imp. Univ. Ser. VI, Vol. II, No. I.

rather clearly. Therefore, it is not so difficult to count the number of chromosomes on the equatorial plate, in spite of their large number and small size. There are 60 chromosomes of oval shape in the spermatogonium (Figs. 1–2). In number and shape the present case shows nothing different from the general type of the Lepidopteran chromosomes.

Throughout the stages of growing period, a plasmosome is always seen in the nucleus (Fig. 3) and there are found nothing to be recognized as the heteropycnotic karyosomes, as described by Stevens ('06), Dederer ('07) and Cook ('10) in some other Lepidopteran species.

The primary spermatocyte divisions could be followed extremely clearly. The equatorial plate in metaphase, without exception, shows 30 chromosomes of various sizes. They assume an oval appearance in their polar views (Figs. 4–7), and a dumbbell shape in lateral aspect, representing a clear transverse cleft across the middle region (Fig. 8). In the anaphase all the tetrads divide transversely into two daughter halves, and the separating dyads appear like a pair of chromatids in close contact, simulating somewhat the shape of V's (Fig. 9). From this mode of division, the tetrads in the present case are considered to be diaschistic ones with terminal fibre attachment. In principle of the tetrad formation, they are similar to descriptions expressed by the author ('32) for *Oecanthus*. Without exception, throughout these stages of division, filaments can be seen running out of the cells into the cavity of the follicle. As seen in Figs. 8–9, a pair of filaments is developed from each centrosome of the cell. These filaments seem to be of the same nature as those described by Meves ('97) and Gatenby ('17) in some other species of the Lepidoptera.[1)]

The secondary spermatocyte division is easily recognizable by the small size of the cells and of the chromosomes, and further, by the occurrence of the single filament developing from the centrosome (Fig. 13), caused by the division of the latter. Thirty chromosomes are always counted in every equatorial plate of the second division (Figs. 10–12). The general appearance of polar views is very similar to that of the first division, except for the difference in the size of the chromosomes. In the anaphase all the dyads divide into two equal

---

1) It now remains obscure whether a small vesicle attaches to the terminal end of the filament as described by Meves ('97).

Concerning the nature and destiny of this central body, I hope to ascertain fully in the future.

halves and neither succession nor precession is observed for any particular chromosome in the course of migration to either pole (Fig. 13). Thus every spermatid recieves an equal set of chromosomes.

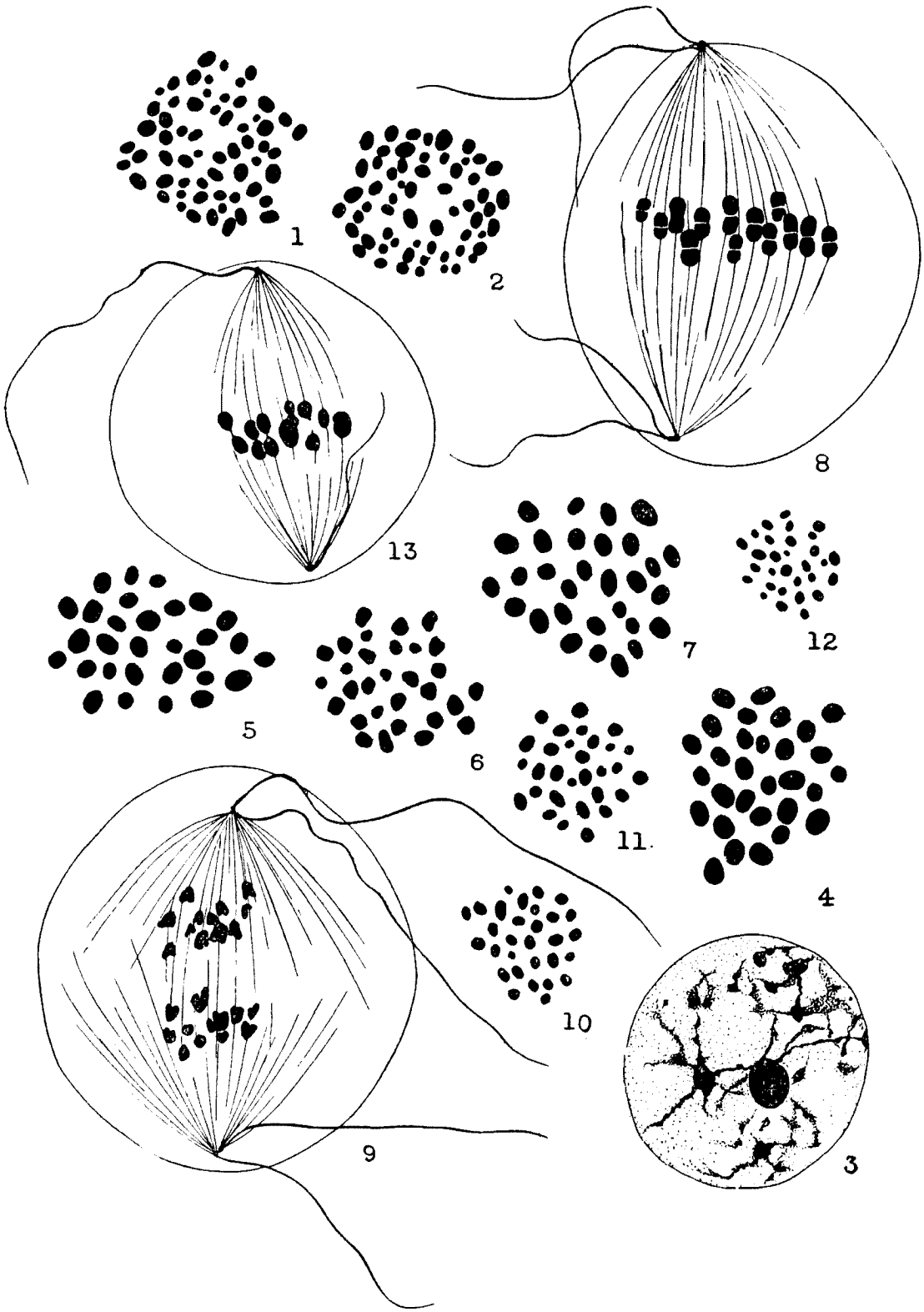
Throughout the two maturation phases, as above described, there are not found any chromosomes to be identified as the sex chromosomes which should be represented by two X's, as being so considered in the Lepidoptera in general.

Explanation of figures: The figures are from camera drawings made with a Zeiss 1.5 mm. *Obj.* and a K 20×*Oc.*, producing a magnification of about 3500 times.

Dendrolimus spectabilis.

p, Plasmosome.

Figs. 1–2. Polar views of spermatogonial metaphase.
Fig. 3. Nucleus from growing period.
Figs. 4–7. Polar views of primary spermatocyte metaphase.
Fig. 8. Side view of the same.
Fig. 9. Side view of primary spermatocyte anaphase.
Figs. 10–12. Polar views of secondary spermatocyte metaphase.
Fig. 13. Side view of secondary spermatocyte anaphase.



Dendrolimus spectabilis.