A beam of X-rays from a tungsten X-ray tube, after passing through a series of lead slits, strikes a rapidly moving disc of aluminium or iron. The secondary rays from the disc are recorded on a photographic film (Eastman "speed" film) in which a hole is cut to allow the primary beam to pass through. With this arrangement, if the secondary radiation is emitted instantaneously the spot on the film should appear in the same position when the disc is spinning as when at rest, whereas any displacement of the spot in the direction of motion would indicate an appreciable time interval between the primary and the resulting secondary X-radiation.

The width of the lead slit next to the disc and also of the hole in the film was 2 mm. The distance of the film and the lead slit from the disc was about 1·5 mm. The thickness of the disc was 0·5 mm., and its linear velocity at the lead slit was varied from 100 to 6000 cm. per second.

The results were affected by the presence of the β-rays and the scattered X-rays which always accompanied the fluorescent rays the emission time of which was being investigated. The β-radiation is less penetrating, and was reduced by inserting various thicknesses of paper between the disc and the film. The effect of the scattered radiation was reduced by using a thin disc for the radiator and by using the lowest voltage, about 18,000 volts, which would excite sufficient intense primary X-rays. Some photographs were taken, however, with voltages up to 80,000 volts. Under these conditions the fluorescent rays of both aluminium and iron disc must have been responsible for a considerable part of the blackening of the film.

In all, about twenty photographs were taken under varying conditions; that is, variations in the voltage on the X-ray tube, speed of the disc, material of the disc, and thickness of paper between the disc and the film. By examining the density of the photographs, a displacement of 1 mm. could have been detected, which would have given a measurement of a time interval as small as 1×10^{-5} of a second between the primary and secondary radiation. No displacement could be detected in any of the photographs, the density being the same on both sides of the slit. Thus the time interval between the incident X-rays and the fluorescent rays excited in iron and aluminium must be less than 1×10^{-5} second.

In these experiments the elements used were of higher atomic number than were those used by C. T. R. Wilson, and they were also solids instead of gases. These results are thus not necessarily inconsistent with Wilson's conclusion that in his experiment a time interval of about 10^{-3} second elapses between the receipt of the primary ray and the emission of the fluorescent ray.

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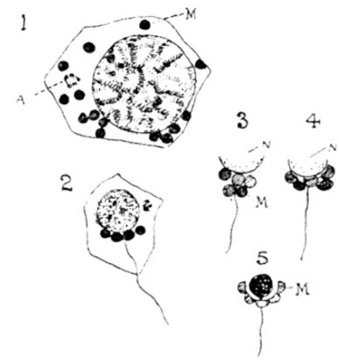
Spermatogenesis of an Indian Scorpion.

THE spermatogenesis of the Scopionidæ has been of special interest since E. B. Wilson's description of the remarkable behaviour of the mitochondria in *Centrurus exilicauda* (Wood). In this species the mitochondria of the spermatocyte form a ring, which is divided out among the spermatids in a regular manner. In another American scorpion, Wilson describes a different and scarcely less remarkable spermateleosis in which the number of individual mitochondria vary from five to seven in the spermatids.

We have recently examined the spermatogenesis in an Indian scorpion (Palamnæus). Fig. 1 shows a spermatocyte with Golgi apparatus (GA) and mitochondria (M). The latter are very large discrete spheres, whereas the Golgi apparatus is small. In Fig. 2, the spermatid is shown. The mitochondria of the spermatids vary from at least four to eleven, though we have not counted many examples. In Figs. 3, 4, and 5, spermateleosis stages are shown.



We have established in this Indian scorpion that (*a*) the mitochondria are sorted out whole during the maturation stages; (*b*) the number of mitochondria varies in the spermatid; (*c*) the mitochondria form the sperm tail directly as claimed for moths by Meves and Gatenby, for cockroaches by Duesberg, for annelids by Gatenby, for other scorpions by Sokolow and Wilson, and for mammals by Duesberg, Regaud, and others.; (*d*) a Golgi apparatus is present and described for the first time, we believe. The apparatus is in the form of batonettes, is small, and, as described first by one of us in Lepidoptera, it appears to take part in the formation of the acrosome.

A fuller account will be published shortly.

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A Device for using Mercury Seals on Ground Joints in Horizontal or Inverted Positions.

WHILE working with Dr. Anderson's vacuum spark apparatus recently, I used mercury seals on certain ground glass joints, not all of which could be upright. It was found that, by turning the apparatus so that an inverted or horizontal joint became upright, and flowing over the mercury some fairly thick solution of celluloid or collodion in amyl acetate, the film so formed over the mercury adhered well to the glass when dry, and would hold the mercury in place whatever the position of the joint. The film should be rather thick, but it is very easily removed and is sufficiently elastic to stand ordinary handling of the apparatus without rupture or separation from the glass.

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The "Bleeding" of Cut Trees.

SEVERAL letters have appeared recently in NATURE on the "bleeding" of trees in spring. Every farmer in Eastern Canada knows that the sap flows most freely from his tapped maples (*Acer saccharum*) when there is frost at night and bright warm sun during the day. But the flow can scarcely be due to a heating of the soil and a consequently increased root activity, for there may be an excellent run of sap while the winter snow is still on the ground.

The yellow birch (*Betula lutea*) of this country yields even more sap than the sugar maple. As the sugar content is small it is never now boiled for syrup or sugar, but as it readily turns sour it was used by the early settlers to make vinegar.

CHAS. MACNAMARA.
Arnprior, Ontario, Canada,
May 13.