Using these two corrected values of C in the R-equation we get

$$W = -\frac{Rhz^2}{n^2}\left\{1+\frac{\alpha^2 z^2}{n^2}\left(\frac{n}{l+1}-\frac{3}{4}\right)\right\}, \text{ for + spin}$$

$$= -\frac{Rhz^2}{n^2}\left\{1+\frac{\alpha^2 z^2}{n^2}\left(\frac{n}{l}-\frac{3}{4}\right)\right\}, \text{ for - spin}$$

which are the well-known spin-relativity Eigen-values of energy.

K. C. KAR.
K. K. MUKHERJEE.

Physical Research Laboratory,
Presidency College,
Calcutta.

Polyembryony in Solanaceæ.

HABERLANDT[1] has observed parthenogenetic development of the endosperm, and early stages in the development of adventitious embryos in *Scopolia*, grown under unfavourable conditions. Biraghi[2] also observed the formation of adventitious embryos in *Nicotiana rustica* var. *Brasilia*, when pollinated with *Petunia* pollen. Young[3] found the presence of more than one embryo-sac in the same ovule of *Solanum tuberosum*. He believes that only one embryo-sac matures while the other degenerates. In the course of our investigation on the embryology of Solanaceæ, evidence of polyembryony has been obtained in different genera grown under natural conditions. In *Nicotiana plumbaginifolia* two well-developed embryos have been found in two separate embryo-sacs in the same ovule (Fig. 1). Two fully mature embryo-sacs in the same ovule have also been observed in *Withania somnifera* (Fig. 2), and in *Physalis minima*. Earlier stages in the development of adventitous

Fig. 1.

Nicotiana plumbaginifolia; two developed embryos in the same ovule.

Fig. 2.

Withania somnifera; two mature embryo-sacs in the same ovule.

embryos by the budding of the nucellar cells covering the embryo-sac have been observed in *Petunia nyctaginiflora* and in *Withania somnifera*. It follows, therefore, that polyembryony is not uncommon in Solanaceæ. The development of more than one embryo-sac in the same ovule is generally due to the simultaneous development of more than one megaspore mother cell, which appears to be a common feature in most of the species of Solanaceæ. A detailed study of

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[1] Haberlandt, "Schnarf", *Vergleichende Embryologie der Angiospermen*, p. 177, 1931.

[2] Biraghi, *Annali di Bot.*, **18**, 216, 1929.

[3] Young, *Amer. Jour. Bot.*, **9**, 213, 1922.

the embryogeny of Solanaceæ has been made by the junior author and will shortly appear elsewhere.

ILABONTO BANERJI.
PARAM NATH BHADURI.

Department of Botany,
Calcutta University,
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The Germ Cells of *Ichthyophis glutinosus*.

PROBABLY due to difficulty in getting adequate material, our knowledge about the germ cells in Gymnophiona, their origin and the general problem of gametogenesis in this group remains very meagre as compared with the work on other amphibians. Apart from the works of Spengel[1] and the Sarasins[2] no reference to any recent literature is available. Even these authors confine themselves to certain aspects of the urino-genital system of Gymnophiona. The Sarasins have described the mature spermatozoan and admit to their not having studied its development.

The testes in Ichthyophis are segmented and extend over nearly two-thirds of the length of the body. One fact of importance is the indefiniteness in the number of these

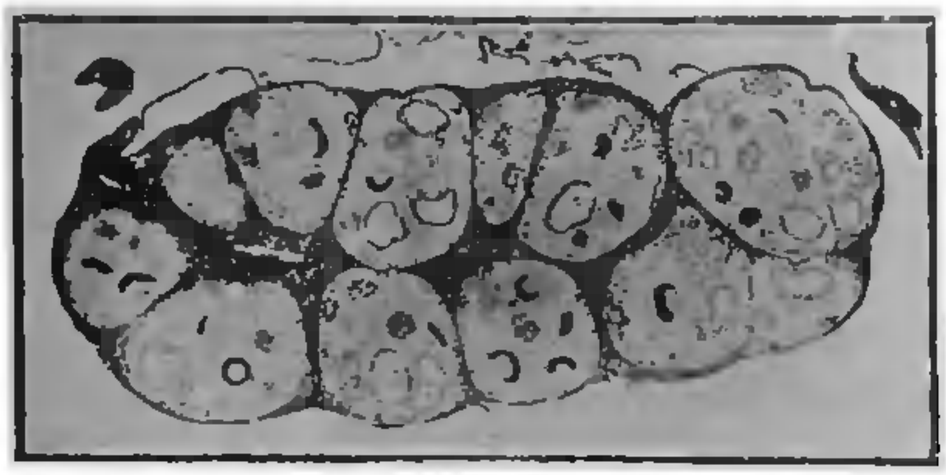

Fig. 1.

Longitudinal section of a testis-lobe of Ichthyophis.

testis-lobes, which may vary in different animals and even on the two sides of the same individual. The latter feature may perhaps be explained as due to the asymmetry of organs on the two sides consequent on the burrowing and coiling habit of these animals. So far as I am aware, the number of the testis-lobes may vary between six and fifteen on each side. Nor is there any relation between the number of the testis-lobes and the age of the animal. For, I have found in young forms (where still the gill clefts are not closed) the number of the testis-lobes larger than in some adults. The size of the lobes also is subject to great variation. Sometimes a lobe may measure over 5 mm. in length in certain regions while in others, it may be smaller than a millimetre.

The anatomy of the testis and its relation with the excretory system have been studied by Brauer.[3] An external examination of the testis-lobe reveals its deeply lobulated nature, marked on the surface by convex rounded elevations. In Urodeles (Humphrey,[4] Kingsbury[5]) the testis is an elongated cylindrical organ traversed by a longitudinal central collecting duct around which the lobules are arranged radially. It is also well known that in each locule, the cells develop synchronously. In some forms (Kingsbury,[5] Humphrey[6]) a postero-anterior development of the germ cells (Spermatogenetic wave) has resulted in the formation of a multiple testis, which, however, is different from that in Ichthyophis. In this form, the longitudinal collecting tube is by no means so regularly central as in Urodela and the locules are arranged in a more irregular fashion. Another thing of importance is the absence of this synchronous development of the germ cells in the locules. The locules are very large and filled with loose fibrous tissue in which are embedded the germ cell cysts without any definite walls of their own. A large number of such cysts can be distinguished in each locule representing every stage in spermatogenesis, from the spermatogonia to the fully formed sperms.

The testis is covered by a germinal epithelium which is continuous with the peritoneum of the coelom. It is usually thin consisting of a single layer of columnar or cubical cells but at some places thickens to form aggregations of very deeply staining cells. An examination of the sections of the testis shows that these aggregations occupy the interstices of the locules also, investing

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[1] Spengel, J. W., 1876. *Arb. aus dem Zool. Zootom*, 3, S. 1–114.

[2] Sarasin, P. & F., 1890. *Ergeb. Natur. Furchungen auf Ceylon*, 2, S. 1–263.

[3] Brauer, 1902. *Zool. Jahrb. (Anat.)*, XVI.

[4] Humphrey, R. R., 1925. *Biol. Bull.*, Vol. XLVIII, No. 3, pp. 145–166.

[5] Kingsbury, B. F., 1902. *Am. Journ. Anat.*, Vol. I.

[6] Humphrey, R. R., 1922. *Biol. Bull.*, Vol. XLIII.