

An account of the development of the embryo sac of *B. indica* was read before the Botany Section of the Indian Science Congress, 1932, held at Bangalore. The work carried out so far is briefly summarised below:—

The development of the megaspore-mother cell and the embryo sac has been followed

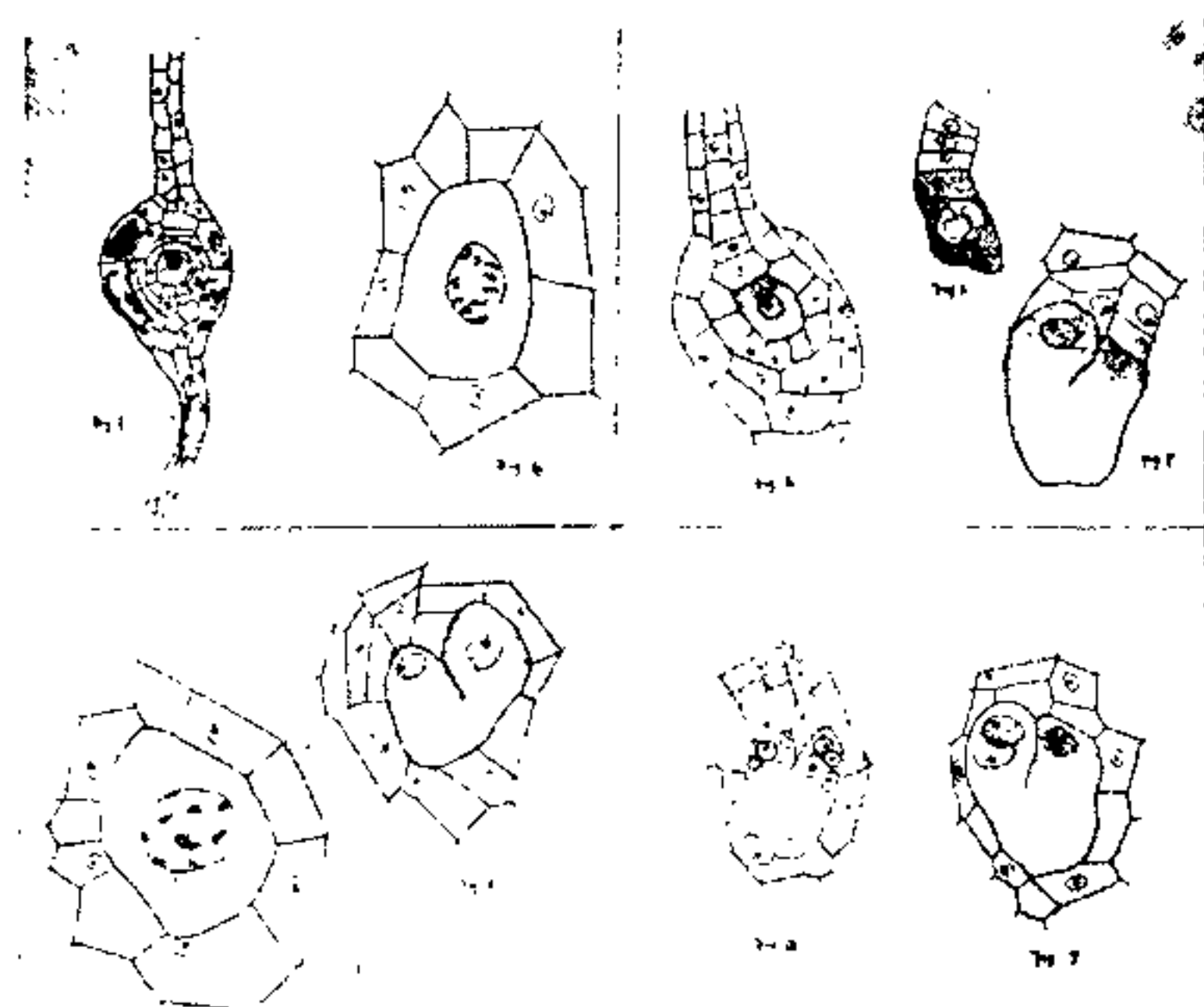


Plate II.

stage by stage (Plate I) and it closely resembles the description given by Lotsy<sup>1</sup> for *B. globosa*, except for the fact that the U-shaped embryo sac is rather broad with the two limbs being closely approximated. One noticeable feature is the presence of a row of three to four rectangular cells overlying the antipodal limb of the embryo sac, just the reverse in position of what Trube<sup>2</sup> has figured. Eight nucleated embryo sac is

<sup>1</sup> Lotsy, J. P., 1899, "*Balanophora globosa* Jungh.," *Ann. du Jard. bot. de Buitenzorg*, Bd. 16.

<sup>2</sup> Trube, M., 1898, "Lorgane femelle et l'apogami du *B. elongata*," *Ann. du Jard. bot. de Buitenzorg*, Bd. 15.

commonly found, the egg nucleus being not prominent. Several stages of the development of the endosperm and embryo have been observed (Plate II, Figs. 1, 2 and 3). No sign of pollen tube or fertilization has been noticed. Further study is in progress.

Regarding the microsporogenesis, the important features illustrated by figures (Pl. II, Fig. a to o) are stated here, the details being reserved for a comprehensive paper to appear elsewhere shortly. Microspore-mother cells are generally spherical in shape but some, however, retain their hexagonal outline. During meiosis, the nuclear membrane persists even after the diakenesis stage, disappearing only at the first metaphase stage. The chromosomes are short, thick and very small. At the metaphasic equatorial plate the chromosome number appears to be about sixteen. If this is confirmed by further observations, this number will coincide with that reported by Earnst<sup>3</sup> for *B. elongata*. Cell division by means of an incipient furrow is started at the end of the heterotypic division and does not progress further. In the second division the spindles are generally parallel but in some cases they are at right angles to each other. At the telophase and even later four groups of chromosomes can be noticed at the four corners of the mother cell, lying in the same plane. The formation of the daughter nuclei continues, leading generally to the tetrad arrangement of the microspores.

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<sup>3</sup> *Die zytologie der Blütenpflanzen*, 1926, p. 523, by P. N. Schurhoff.

## Research Notes.

### Width of the D Lines of Sodium in Absorption.

S. K. KORFF (*Astrophys. Jour.*, 76, 124, 1932) has, by measurements on the D lines of sodium in absorption, shown that the contours indicate the theoretical variation of opacity with the inverse square of the wavelength distance from resonance and the variation of the width with the square root of the number of atoms in the line of sight. The conclusions are in agreement with the predictions of the radiation

damping theory and also with the quantum mechanical theory of Weisskopf and Wigner. The experiment yields a new independent value for  $e^2/m$  as  $(2.51 \pm 0.2) \times 10^8$ , compared with the accepted value  $2.512 \times 10^8$ . The effect of foreign gases on the width gives values of the effective "interaction radii" as  $7 \times 10^{-8}$  cm. for the Na-He combination and  $2 \times 10^{-7}$  cm. of Na-H<sub>2</sub>, while Na-Na interaction radius is of the order of  $10^{-9}$  cm. These results agree with the observations made in emission spectra of mercury are in atmospheres of foreign gases by



Venkatesachar and Sibaiya (*Ind. Jour. Phys.*, 4, 179, 1929) who state "that neutral normal atoms such as those of helium or normal molecules with negligible electric moment such as those of carbon-dioxide may be present inside the orbit of the optical electron without exercising appreciable influence on it. We, however, find when there is no admixture of a foreign gas in the mercury arc a pressure of 4 mms. has far more influence in not bringing out the higher members than a pressure of 40 mms. due to the introduction of carbon-dioxide." Korff's statement that hydrogen is far more effective than helium in broadening the line gives again the observation of Venkatesachar and Sibaiya that "When the arc is produced in hydrogen, a pressure of one centimetre produces the same effect in respect of widening the lines as a higher pressure say of 4 cm., when the surrounding gas is carbon-dioxide." The latter authors have also given the explanation for this observation. Korff has used 2.5 metre column of low density sodium vapour to make an approach to astrophysical conditions.

#### A Preliminary Note on the Development of *Rana tigrina*.

DR. M. L. SETHI, of Hoshiarpur, has made certain interesting observations on the extreme rapidity of cellular development and of the attainment of the larval stage of *Rana tigrina*. According to him, the frogs spawn in the early hours of the day during the breeding season, the morula stage is reached within an hour and a half after the eggs are laid; epibolic gastrulation, at the end of six and half hours: the neural plate and folds appear in about ten hours. The larvæ hatch out within twenty-four hours. This in his view is remarkable when compared with the developmental history of the English frog which takes usually a fortnight to reach corresponding larval stage. Dr. Sethi further mentions that the external gills appear within a day after hatching and hind-limbs sprout three days after and fore-limbs two days subsequent to this period. The metamorphosis is completed in thirty-eight days while in England frogs take from seventy-seven to eighty-eight days.

He further states that the development of a species of *Bufo* which inhabits Hoshiarpur area, the Punjab is on closely similar lines.

#### The Effect of Humidity on Supersonic Velocity in Air.

M. KINOSHITA AND C. ISHII have shown from thermodynamical considerations (*Tokyo. Sc. Papers.*, 19, 83, 1932) the velocity  $V$  of waves, sonic or supersonic, in a real gas to be  $V = \sqrt{p\beta\gamma/\rho\alpha}$  where  $p$  is the pressure,  $\rho$  the density,  $\alpha$  the expansion coefficient,  $\beta$  the pressure coefficient and  $\gamma$  the ratio of specific heats. Considering both the air and the water vapour as real gases, the velocity in humid air becomes

$$V_h = V_1 (1 + 0.000210e)$$

where  $V_1$  is the velocity in dry air and  $e$  the vapour pressure in mms. of mercury. Using a valve oscillator for exciting oscillations in a rectangular quartz plate of Curie-cut and a thermohygrostat, the authors have obtained results in the supersonic range which can be expressed by

$$V_h = V_1 \{1 + (-0.00023 \pm 0.00001)e\}$$

In conclusion they draw attention to the applicability of this relation to practical hygrometry. The advantage over all other hygrometric devices consists in the possibility of measuring the humidity in any limited space without disturbing the condition of the air in the enclosure.

#### The Chromosome Number in *Sphenodon*.

R. D. KEENAN has given an account of the chromosomes in *Sphenodon Punctatum* (*Journ. Anat.* 1932). According to him, "the number of chromosomes in the spermatogonia of *Sphenodon* is 36, i.e., 12 V- or J- shaped, 16 rods, two very short rods and 2 micro-chromosomes. The equatorial metaphase plate of the first division shows 18 tetrads, 6 of which have an atelomitic attachment of the spindle fibre and the remainder a telomitic attachment. The atelomitic tetrads are similar in structure to the anaschistic V-shaped tetrads of other Reptilia and also to the ring tetrads of the Orthoptera. The telomitic tetrads usually appear as equatorial rings. Secondary spermatocytes were rare but one observation on the second division at anaphase showed clearly the presence of 18 elements, i.e., 6 V-shaped, 9 rod-shaped and 3 dot like. From the observations made, it is highly probable that the male is homozygous in respect to sex, the condition of the chromosomes being XX. Applying the theory of Robertson concerning the formation of V-shaped chromosomes to those of *sphenodon*, it is possible that the



primitive number of chromosomes in the reptilian order is 48. It is suggested that the chromosomal formula of the Autosauri has been derived from this primitive number principally by a reduction in the size of the individual elements."

#### Study of Mountain Structures.

"THE Application of Mechanical Structural Principles in the Western Alps" forms the subject of an interesting paper by Andrew Leith recently published in the *Journal of Geology*, Vol. IX, 39, 1931). After giving a brief review of the generally accepted hypothesis regarding the origin of the Alps based on stratigraphic, lithologic and palæogeographic evidences, the author states that there is generally a complete neglect, in these hypotheses, of mechanical structural factors. The need for employing such evidence in the elucidation of obscure problems of Alpine structure is emphasized and numerous examples are given where the author has applied such mechanical structural evidence successfully in the "Hautes Alpes Calcaires" of the Western Alps.

#### Histology of the phloem necrosis of Potato.

"A STUDY of the histological changes resulting from certain virus infections of the Potato" forms the subject of a well-presented paper, recently published (*Proc. Roy. Soc., Ser. B.*, 3, No. 769) by F. C. Bawden. After giving a brief reference to the previous works on the subject from 1913, the author gives a short description of the anatomy of the healthy stem of potato with its isolated groups of inner phloem and the outer phloem which becomes linked up with the formation of the secondary phloem. In the mature plant there is a considerable amount of secondary phloem. The wall of the sieve tubes sometimes becomes slightly thickened with cellulose but shows no pathological changes. The author agrees with Quanjer's division of the Streak Disease into two main groups, *e.g.*, Acronecrosis or Top-Necrosis and Acropetal Necrosis or Leaf Drop Streak. In top necrosis, necrotic spotting of the upper leaves followed by the dying of the plant from top downwards form the main external feature. Internal symptoms are started in the petioles, stem and tubers and consists of necrotic changes in the phloem. In the tubers and stems grown at high temperatures, phellogens are formed round

the necrotic areas. The external symptoms of Acropetal Necrosis are crinkling of the upper leaves, necrosis and falling of the lower leaves. Internal symptom consists of necrosis affecting chiefly the collenchyma as seen generally in the stem and petioles. The necroses are produced in the phloem of plants suffering from leaf-roll in the year following that of infection and are restricted to the phloem elements and consists in lignification. No necroses were found in the virus free stem or petiole.

#### The Menstrual Cycle of the Primates.

THE fifth part of this very important series of papers on the "Menstrual Cycle in the Baboon" by Dr. S. Zuckerman and Dr. A. S. Parkes (*Proc. Zoo. Soc.*, 1932, Part I) embodies the results of an investigation into the morphological changes in the reproductive cycle of the female baboon as evidenced by an examination of twenty-one specimens of both species, *Papio hamadryas* and *P. porcarius*. The cyclical changes are essentially the same in the two, except for the greater size of the non-pregnant uterus in the Chacma species (*P. porcarius*)—which in all probability can be accounted for by the larger size of the animal itself—and its deeper endometrium. An examination of the general morphology of the reproductive organs reveals that the baboon corresponds to the type found in the Old World apes and monkeys. During the course of the cycle the region surrounding the anus and the external genitalia swells to form the "sexual skin", which, undergoing cyclical changes itself, acts as an excellent external indication of the very complicated internal phenomena. Its history can be said to begin soon after menstruation has set in, when it swells very soon attaining a maximum size. Suddenly, however, it is seen to subside and become quiescent. This coincides with the rupture of a ripe Graafian follicle. The skin remains in this condition till the onset of the next menstrual bleeding.

The ripe Graafian follicle of the baboon is quite large, the largest measuring over 6 mm. in average diameter. It is noticed that the history of the growth of the follicle can be divided into two phases: first, when the oocyte and the follicle grow together and subsequently, when the ovum ceases to grow while the follicle continues to. As soon as the ovum is extruded, along with a



large quantity of liquor folliculi, the thecae rupture and their tongues project into the ruptured follicle dividing it into lobes. By this time the granulosa cells are slowly being transformed into luteal cells. The rupture of the follicle which is coincident with the subsidence of the sexual skin at once initiates the formation of the corpus luteum and three days later it is seen to be definitely formed. Very soon and very rapidly, however, it degenerates and, by the time the next luteal phase is established, it is hard to be distinguished. The history of the corpus luteum in the pregnant animal, on the other hand, has not been worked out so thoroughly, due, probably to lack of material. It is, however, noticed that the corpus luteum of pregnancy is the largest in the entire cycle; but it is not known when the degeneration of the corpus luteum of pregnancy takes place.

Menstruation in the baboon consists of a destruction of the outer two-thirds of the endometrium accompanied by profuse bleeding. The ruptured glands and their secretion, clumps of stromal cells and patches of surface epithelium constitute the debris. There does not, however, seem to be any uniformity in this isolation of the uterine epithelium and a part of its underlying endometrium, for different regions of the uterus are involved at different times and in different degrees. First the stroma is destroyed and the glands are affected later, consequent on the sequestration of the tissue in which they are lodged. Very early in the follicular phase the endometrium is regenerated. Though the exact nature of this regeneration process has not been ascertained, it is certain that even in the later stages of the menstrual process the surface epithelium is restored everywhere. The glands are straight,

long and tubular and there is no secretion in their lumen. The regeneration of the endometrium continues during the ensuing luteal phase when the stroma becomes oedematous and the glands are extremely long, coiled and distended with secretion. The changes that occur in the uterus after parturition are not found to be very different from those in the uterus of the common macaque and man. During this phase the endometrium is very shallow and the ovaries inactive. The presence, in this stage, of a large quantity of debris in the uterus of the nursing animal has not been accounted for, unless it is assumed that a degeneration of the endometrium and the myometrium takes place during nursing.

The vagina in the non-pregnant animal has a greatly thickened and keratinized epithelium. During the luteal phase the cell layers are gradually sloughed off till at the beginning of menstruation the ragged surface left by the desquamation is repaired and the epithelium consists of a thin layer. During menstruation again the vaginal epithelium is thickened and cornified. This continues through the follicular phase leading to the typical corrugated epithelium seen just before ovulation. During pregnancy, especially during its later stages, large mucin cells are seen to develop in the crypts of the vagina. After parturition the vagina lapses into a state of inactivity.

In the non-pregnant animal there is little change observed in the mammary glands. In fact their functional activity starts from the moment of parturition but they atrophy if suckling is discontinued. Available evidence makes it possible to believe that the mammary glands are permanently active.

## A Scheme for Advancing Scientific Research in India.

By P. W. Gideon, *Karnatak College, Dharwar.*

SCIENTIFIC research in this country is comparatively young, and it is unfortunate that when India has just begun to encourage research of definite economic value there should be a setback in the form of financial stringency. As a result, valuable research work in Agriculture and Medicine, which has brought definite material prosperity to the country is likely to suffer, unless some scheme is devised for still encouraging and financing such work. The following is a suggestion put forward in the hope that, not only those who are engaged in research, but also those who are interested in the economic value of the results of such research, will do all in their power to encourage such work in India.

The majority of colleges teaching Science in India are really free centres for research, having trained men with leisure for such work, and well-equipped laboratories at their disposal. Might not a request be made to the Government of India that they invite, through Provincial and State Governments, the services of these men to work on research problems which have a direct economic value from the Agricultural, Medical, and Veterinary points of view? Most colleges teaching the science courses for the I.Sc. and B.Sc. examinations have laboratories equipped for research purposes and the majority of the members of the staff are expected to interest themselves in research work. The