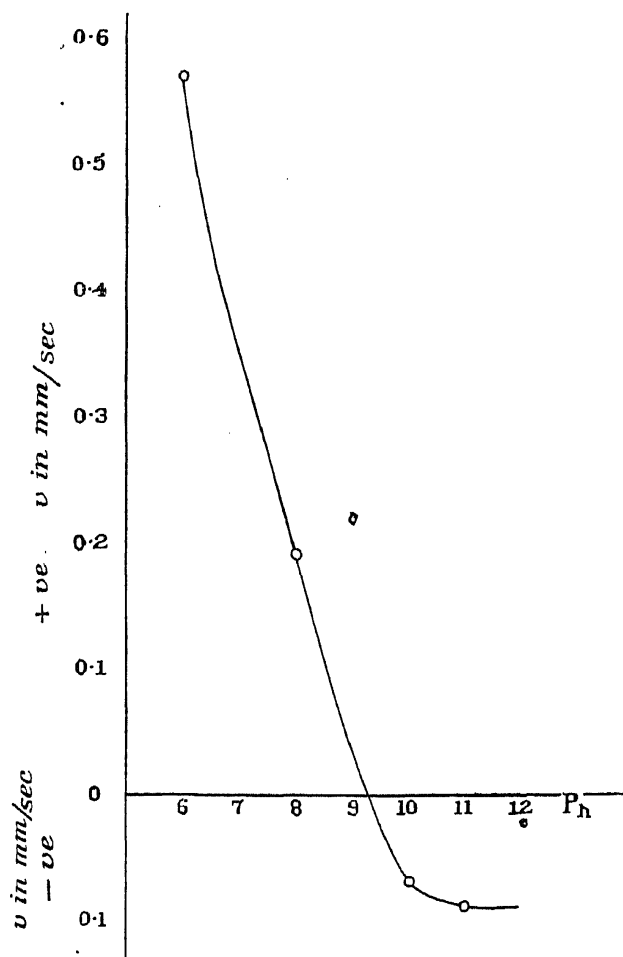


The above values are calculated for the same strength of current. The contents of the various chambers were tested biologically by feeding them to polyneuritic pigeons, and the biological test gave results in substantial agreement with those obtained by chemical assay.

The same problem was further studied by the method of micro-cataphoresis, using the Brown and Broom cell as modified by Millwood.⁶ The migration velocity of Kieselguhr particles was determined at various levels of pH — (a) without vitamin B₁, (b) with the vitamin adsorbed on the particles. The difference in velocity so observed was calculated with due attention to the sign of the charge. The results are shown graphically in the following figure, in which the



ordinates represent the change in velocity produced by the vitamin, and the abscissæ various values of pH. The velocities are in mm./sec. with a current strength of 1 milliamp. and voltage 220 acting between poles 16 cms. apart.

The results of the micro-cataphoresis experiments indicate that the iso-electric point lies between pH 9 and 10, nearer 9 than 10. From the graph its location appears to be at about pH 9.2.

Full details of these experiments will be published in the *Indian Journal of Medical Research*.

G. NARASIMHAMURTHY.

Nutrition Research Laboratories,
Coonoor.

February 5, 1936.

¹ Birch, T. W., and Guha, B. C., *Biochem. J.*, 1931, 25, 4, 1391.

² Sankaran, G., and De, N. K., *Ind. Jour. Med. Res.*, Oct. 1934, 22, No. 2, 233.

³ Ghosh, A. C., and Guha, B. C., *Curr. Sci.*, May 1935, 3, 555.

⁴ Kinnersley, H. W., et al., *Biochem. J.*, 1933, 27, No. 1, 225.

⁵ Kinnersley, H. W., et al., *Biochem. J.*, 1934, 23, 667.

⁶ Brown, H. C., and Broom, J. C., 'System of Bacteriol', 1931, 9, 278.

Identity of Noroxylin with Baicalein.

IN continuation of our previous letter on the constitution of Oroxylin¹ we have now confirmed our conclusion that noroxylin is baicalein by means of a mixed melting point determination with an authentic sample of baicalein kindly supplied by Professor Keita Shibata. There would seem to be no doubt, therefore, that oroxylin is the 6-methyl ether of baicalein.

R. C. SHAH.

C. R. MEHTA.

T. S. WHEELER.

Royal Institute of Science,
Bombay,
February 12, 1936.

¹ *Curr. Sci.*, 1935, 4, 406.

Pollen Grains in the Stylar Canal and in the Ovary of an Angiosperm.

IN a letter to *Nature* last August Mr. B. M. Johri³ of Agra announced the discovery of pollen grains lying inside the stylar canal, and in one case even inside the ovary, of an angiosperm, *Butomopsis lanceolata* Kunth. An outline sketch of a longitudinal section of the ovary shows that the stylar canal opens to the exterior through the stigma. There is a row of five pollen grains arrested in the upper part of the canal, the diameter of which, according to the sketch published, is about 1½ to 2 times as large as that of the spores. The pollen found in the ovary was not figured. As the full description is not yet available one cannot say whether these pollen grains belonged to the species in whose ovary they were found.

Mr. Johri states that "in one case a pollen grain had germinated and sent out a small pollen tube", but he does not say whether this pollen grain was in the stylar canal or in the ovary. The fact that it had put out a pollen tube, although interesting, is no proof that it was not a "foreign" spore;⁶ Mr. Johri will no doubt clear this point in the full paper. "Usually the pollen grains germinate on the stigma."

The development of the female gametophyte has interesting features of its own, but to the present writer the pollination phenomena briefly described by Mr. Johri seem to surpass them in importance. For, whether the pollen grains found in the ovary and stylar canal belong to *Butomopsis* or not, their occurrence in these positions, even though occasional, is a distinctly gymnospermous feature. It seems impossible to explain the entry of these spores, even into the upper part of the canal, except on the assumption that they were drawn in by some sort of suction mechanism like that of the "stigmatic drop" of gymnosperms, the stylar canal functioning like a micropyle.

One is at once reminded of Professor T. M. Harris's recent discovery, (which obviously deserves wider notice) of pollen grains inside the supposed "angiospermic" fruit of a new species of *Caytonia*, *C. Thomasi* T. M. Harris.^{1,2} Professor Harris (1933) has figured preparations, some of which I have had the privilege of examining in his laboratory, and which leave no room for doubt that at least at pollination time the fruits were not closed. The ovules were open to access by pollen grains, as in the gymnosperms. Harris writes that "the considerable majority of well-preserved seeds.....possess pollen grains.....in their micropyle", while "practically no pollen grains (apart from those in micropyles) occur in the interior of the fruit". From the appearance of cuticular preparations of the stigma and fruit, both in *C. Sewardi* and *C. Thomasi*, it is inferred that the pollen grains gained access to the micropyles through definitely organised canals, at the tips of which the spores were probably caught in "stigmatic drops" secreted by the ovules.

One might imagine some such result if the incurved ovuliferous organ of a *Stachyotaxus* or of a *Palissya*-like gymnosperm were to become completely doubled upon itself, the opposing inner surfaces leaving only narrow

chinks between them for the ingress of pollen. However that may be, Harris's discovery on the one hand, and Johri's on the other, are enough to set one thinking, to say the least. Either we must relax our definition of an angiosperm, or we must be prepared to agree that *Caytonia*, at least, is not yet quite an angiosperm! And if you thus make a breach in the supposed angiospermy^{7,8} of the Caytoniales through the perforated ovary of their type genus, who knows what is in store for *Gristhorpia* and the rest? Indeed, Harris's 1933 work (p. 112) tends to make it possible that the difference between *Caytonia* and *Gristhorpia* may not be of generic rank.

Now, if the mode of pollination in *Caytonia* is to bring that genus within the gymnosperm fold, where Prof. Kräusel had already placed the whole group,⁵ what of *Butomopsis*, an undoubted angiosperm, and a monocotyledon at that? Shall we say that it has retained the open stylar canal, postulated by Professor Harris (p. 108) for the primitive angiosperms? This seems to be the only natural and reasonable conclusion, although it is opposed to Mr. A. C. Joshi's attractive theory (1934) that the stylar canal of angiosperms owes its origin to the disintegration of a vascular tract in the carpel.⁴

The whole question is very intriguing, and we obviously need more facts, covering a wider field; but Mr. Johri deserves thanks for bringing to notice what can only be regarded as a relic of gymnospermy in a confirmed and unquestionable angiosperm. It is not unlikely that many other instances of the kind have passed unnoticed, because modern workers on angiosperm life-histories do not so often investigate the styles and stigmas as it seems they should, and no doubt will do in future, with the recent revival in carpel studies.

Dr. Hamshaw Thomas's work on the Caytoniales will always remain a classic of palaeobotanical investigation, in which the possibilities of cuticular technique were demonstrated in a brilliant manner. Although one need not stand committed to all his theoretical conclusions he has certainly shown an *approach* to angiospermy,⁹ and has set others on the quest.*

The University, Lucknow. B. SAHNI.
January 18, 1936.

* Since my note on pollen grains was communicated Mr. Johri of Agra has kindly shown me

some of his selections. I am satisfied that the pollen grains figured by him in the stylar canal belong to the *Butomopsis*: they are identical in character with the pollen grains found in the anthers of this plant. I have not seen the sections showing pollen grains inside the ovary, but there is no reason to doubt the accuracy of his observation. These observations should be worthy of a detailed record even if the pollen grains were "foreign". Mr. Johri's full paper may be awaited with interest.

¹ Harris, T. M., "The fossil flora of Scoresby Sound, East Greenland," *Mémoires de Grönland*, 1932, **85**, 1-133.

² Harris, T. M., "A new member of the Caytoniales," *New Phyt.*, 1933, **33**, 97-114.

³ Johri, B. M., "Life-history of *Butomopsis lanceolata* Kunth," *Nature*, 1935, **136**, 338.

⁴ Joshi, A. C., "Morphology of the stylar canal in angiosperms," *Ann. of Bot.*, 1934, **48**, 967-974.

⁵ Kräusel, R., in Engler's *Nat. Pflanzenfam.* 2nd ed., 1926, **13**.

⁶ Sahni, B., "Foreign pollen in the ovules of *Ginkgo* and of fossil plants," *New Phyt.*, 1915, **14**, 149-151.

⁷ Thomas, H. Hamshaw, "The Caytoniales, a new group of Angiospermous plants from the Jurassic rocks of Yorkshire," *Phil. Trans. Roy. Soc. London, Ser. B.*, 1925, **213**.

⁸ Thomas, H. Hamshaw, "The early evolution of the angiosperms," *Ann. of Bot.*, 1931, **45**, 652, 654.

⁹ Thomas, H. Hamshaw, "The nature and origin of the stigma," *New Phyt.*, 1934, **33**, 173-198.

With reference to the above note of Prof. B. Sahni, a copy of which was kindly shown to me about a week after it had been sent to the press, I think it necessary to make the following remarks. The necessary figures and some other interesting details will be found in my full paper which will soon appear elsewhere.

1. In the stylar canal of one carpel there was a row of six pollen grains of which five could be seen in a single section. It is this that was figured in the note published by me in *Nature*. The pollen grains are approximately 24 microns in diameter and the stylar canal is $1\frac{1}{2}$ to 2 times as wide.

2. In a dozen other cases (from three different flowers) pollen grains were found *inside the ovary*. One of these was located on the surface of an ovule (which was unfortunately cut obliquely) and had actually germinated, although the pollen tube was very short.

The writer was himself greatly surprised when he saw these pollen grains in such unexpected quarters and a careful examination of their size and nuclear contents left no doubt whatever that they belonged to the same species.

Before entering into a detailed discussion of the theoretical bearings of this discovery, the writer wished to be sure whether a similar thing had been observed before in any other plant. An enquiry from Prof. K. Schnarf of Vienna brought forth the reply last month, that the phenomenon was absolutely unique and had never been noticed by him in the existing literature on Angiosperms.

As Prof. Sahni has pointed out, the occurrence of pollen grains inside the ovary of an undoubted angiosperm like *Butomopsis*, sets one thinking about the difference between a Gymnosperm and an Angiosperm. *Caytonia Thomasi* provides material for comparison and speculation; and so does *Gnetum*, if we agree to designate the inner envelope as a stylar canal and not as an integument.

B. M. JOHRI.

Botany Department,
Agra College, Agra,
February 1, 1936.

Chromosome Numbers in *Phœnix farinifera*, Roxb.

TWENTY-ONE species of *Phœnix* have been enumerated in the *Index Kewensis*; of these, five species are natives of South India. The chromosome numbers of the various species are not available except for the cultivated date palm—*Phœnix dactylifera*, Linn. Nemec (1910) gives the $2n$ number as 28.

The author of the present note has, from several counts made in the metaphase plates of pollen mother-cells, determined the haploid (n) number of chromosomes in *Phœnix farinifera*, Roxb. (common on the east coast of the Peninsula) as 18.

G. V. NARAYANA.

Oil Seeds Section,
Agricultural Research Institute,
Coimbatore,
January 6, 1936.

Ram Sarcophagus from Cuddappah.

WITH reference to Mr. M. D. Raghavan's article on "A Ram Sarcophagus from Cuddappah" appearing in 1935, November issue of *Current Science*, the following observations may be of interest.

After seeing the object in the Madras Museum and after examining its detachable head carefully, I find myself unable to