

endeavour has been to furnish the Haffkine Institute with the most modern and up-to-date equipment.

The chief problems of India are poverty and pestilence. If we have to have our public health problems tackled in an effective way,

each Province should organise at least one Institution; it is revealed that Russia, which has tackled her public health problems in an admirable way, has 200 Medical Research Institutions. How many India shall need can easily be gauged.

## SOME ABNORMAL POLLEN GRAINS OF *PINUS EXCELSA* WALL.

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### INTRODUCTION

POLLEN grains of *Pinus excelsa* Wall., as also those of other members of the Abietineæ, are normally two-winged. However, abnormal pollen grains—with one wing (encircling the body like a frill), three wings or four wings—have been infrequently observed among normal pollen of both modern and fossil material of *Pinus* and in some modern species of *Cedrus* and *Abies*. Such abnormalities are by no means confined to the Abietineæ but they are recorded in other tribes also, e.g., in the Podocarpaceæ the number of wings is very variable and abnormal grains have been observed in more than one species of *Podocarpus*.

One-winged pollen grains with a single bladder exine encircling the body like a frill are recorded by Wodehouse (10, p. 266, pl. 3, fig. 8) in *Abies nobilis* and similar grains have been observed in *Cedrus Deodara*, *Podocarpus nerii-folia* (1, pl. 5, fig. 11; and pl. 13, fig. 19) and in at least one other species of *Podocarpus* (10, pp. 219, 274). Florin (2, p. 639, text-figs.

"Eneroth has found that among 38,887 sub-fossil pollen grains of *P. silvestris* collected in the Swedish province of Norrbotten 0.04 per cent. exhibited an abnormal number (1, 3 or 4) or extension of the air sacs".

Three-winged pollen grains are recorded in more than one species of *Pinus*. Florin (2, p. 639) has recorded from the post-glacial deposits of Sweden a number of three-winged pollen grains of *P. silvestris*, and similar abnormal grains of *P. Banksiana*, *P. Strobilus* or *P. resinosa* have been figured by Wilson and Webster (9, pl. 2, figs. 21, 22) from Vilas County bogs in the U.S.A., which are of Pleistocene age.

In modern material of *P. Khasya*, *P. longifolia*, and *P. Merkusii* Miss Chatterjee (1, pl. 14, figs. 20-22) has observed three-winged pollen grains. Four-winged pollen grains have been found in *P. silvestris* (2, loc. cit.), *P. Banksiana* (?), *P. strobilus* or *P. resinosa* (9, figs. 25, 26).

Although abnormal pollen grains with one or four wings are already reported in other species of *Pinus*, so far as the author is aware they have not been previously observed in *Pinus excelsa*.

### DESCRIPTION

Fig. 1 is a photomicrograph of a one-winged pollen grain, which measures  $76.5\mu$  in diameter. The bladder exine, which encircles the body in the form of a frill, shows a strong tendency to get transformed into two wings. Another abnormal pollen grain, illustrated in Fig. 2, shows two notches and in this specimen a tendency to get transformed into three wings is clearly seen.

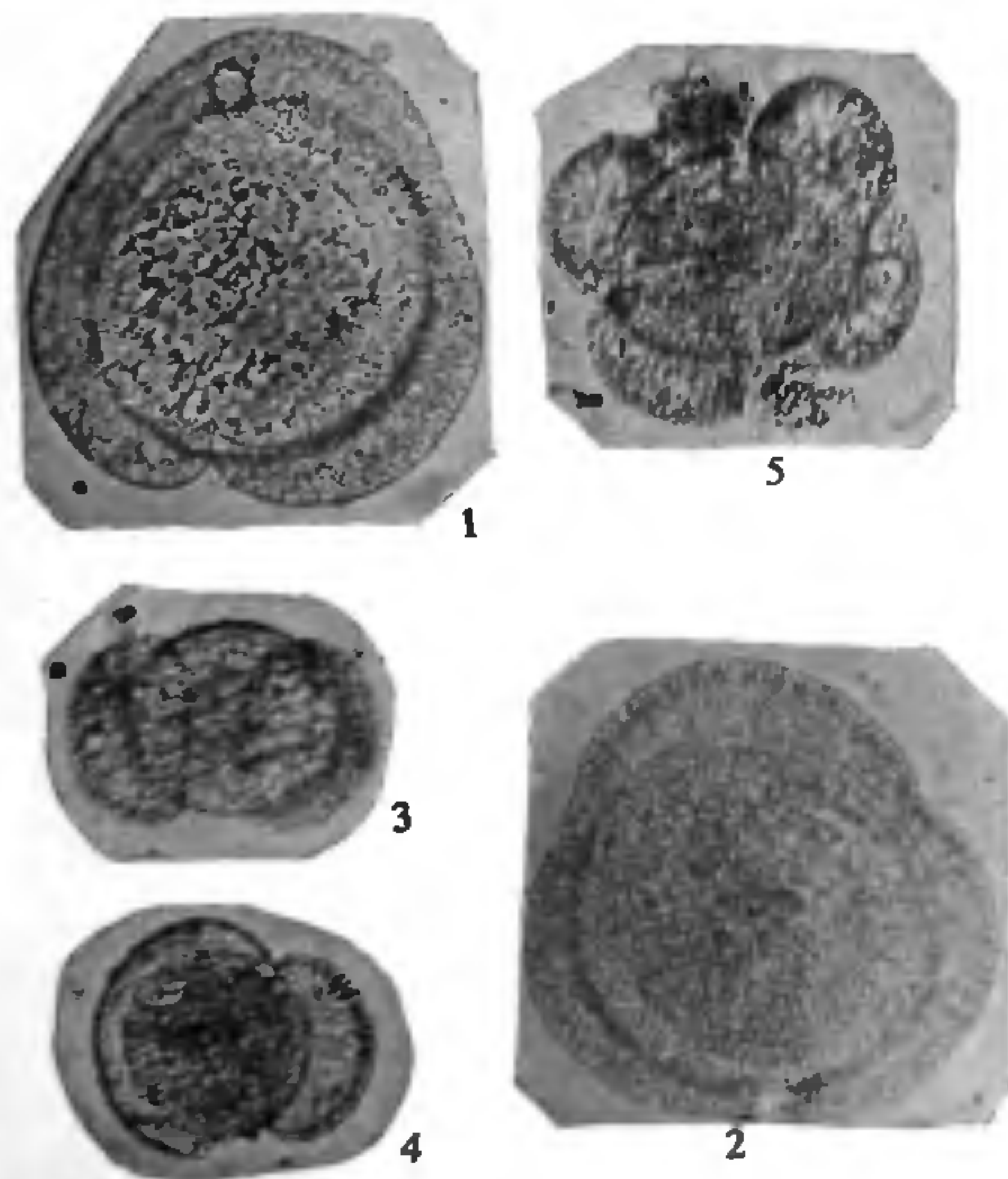
Fig. 4 is a photomicrograph of another abnormal pollen in which the two bladders are of unequal size (cf. fig. 3, a normal pollen grain) and similar pollen grains seem to be fairly common in this species.

A four-winged pollen grain is illustrated in Fig. 5. In this specimen the four bladders are symmetrically arranged round a body, which measures  $54\mu$  in diameter.

### DISCUSSION

It is interesting to note that a single bladder exine, which is evidently an abnormality in modern and Pleistocene conifers, is a normal feature in ancient member of this group.

Some Palaeozoic members of the Coniferales, e.g., *Walchia*, *Lebachia* and *Ernestiodendron* (3) possessed one-winged pollen grains which do not seem to be very different from what we have described above. Pollen grains of Cordaitales were also one winged and in



4c, d and e) has figured two one-winged pollen grains of *P. silvestris* from postglacial deposits of Sweden and according to him



*Spencerites insignis* Scott (7, p. 170, figs. 78A, B and 84) and *S. membranaceous* Kubart (4, photo. 3), (ancient lycopodiaceous plants), though the pollen grains were much larger they bear a striking resemblance in external morphology to our one-winged pollen grains. In the light of the above facts one may reasonably ask: Is this abnormality merely a monstrosity of no genetical importance or is the occurrence of one-winged pollen grains in modern and Pleistocene conifers and in the Podocarpaceae a reversion to an ancient character normally found in Palaeozoic conifers? An appropriate answer to this question is furnished by Florin (2, pp. 638-39), who states that "it seems probable that the presence of air-sacs in certain modern genera of the families Pinaceae and Podocarpaceae, is a surviving ancient characteristic. The single air-sac originally present has only been slightly reduced since Palaeozoic times, different in different genera". Wodehouse (10, pp. 219-21) agrees with Florin and states that "grains with this single encircling wing were common in the Palaeozoic and appear to have been the prototypes of the winged-grained Abietineae and Podocarpaceae".

Florin (2) further suggests that "this primitive type of pollen grain probably disappeared and the single encircling air-sac was replaced by two smaller sacs resembling those of the recent conifers of the families mentioned above". From the examination of our abnormal pollen grains it is easy to conceive how a one-winged pollen grain would have got transformed into a two-winged (fig. 1) and a three-winged type (fig. 2). Mehta (5), while supporting Virkki's (8) way of reasoning suggested that the one-winged spore could also have been the forerunner of a three-winged type and quoted Wodehouse and Florin in support of his arguments. From the present evidence it is suggested that a four-winged

pollen grain may have also derived from a one-winged grain in the same way.

In the end I wish to thank Professor B. Sahni, Sc.D., F.R.S., for kind suggestions and helpful criticism of this note. I am further grateful to him for kindly allowing me to examine the thesis of Mrs. Jacob (formerly Miss C. Virkki) and Miss Chatterjee and use the unpublished information in this note.

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## OBITUARY

**DR. HARPRASAD CHAUDHURY, Ph.D.,  
D.Sc. (London), D.I.C.**

**CURRENT SCIENCE** deeply regrets to record the sad and premature demise on 19th August last of Dr. Harprasad Chaudhuri, Head of the Department of University Teaching in Botany, and Director, Kashyap Research Laboratory, Punjab University.

Professor Chaudhuri was born in Calcutta in 1895 and had his school and college education in his native province of Bengal. He graduated from the Calcutta University in 1916 obtaining a distinction in Science. He took his Master's degree in Botany in 1918, and started research having been awarded a Research Scholarship in Botany. In 1920 he went abroad for higher studies and worked for three years as a research scholar under Professor V. H. Blackman, F.R.S., at the Imperial College of Science and Technology in London. After obtaining his Ph.D. and D.I.C.,

he returned to India and was appointed Reader in Botany at the Panjab University. On the death of Professor S. R. Kashyap in 1934 Professor Chaudhuri succeeded him as Professor of Botany which post he held until his death. In 1939 he was admitted to the D.Sc. degree of the London University. Professor Chaudhuri was the first Director of the Kashyap Research Laboratory—an institution founded by public donation to perpetuate the memory of Professor Shiv Ram Kashyap.

Professor Chaudhuri displayed his interest in Mycological research early in his career. On his return from Europe he built up a school of Mycological research in the Panjab University which had already become a centre of research in Bryology under the inspiring guidance of Professor S. R. Kashyap. Professor Chaudhuri's own contributions have enriched the field of Indian Mycology and plant pathology which were his special fields of research. Although essentially a specialist in