be helpful in tracing out the antiquity of early man in the Siwaliks.

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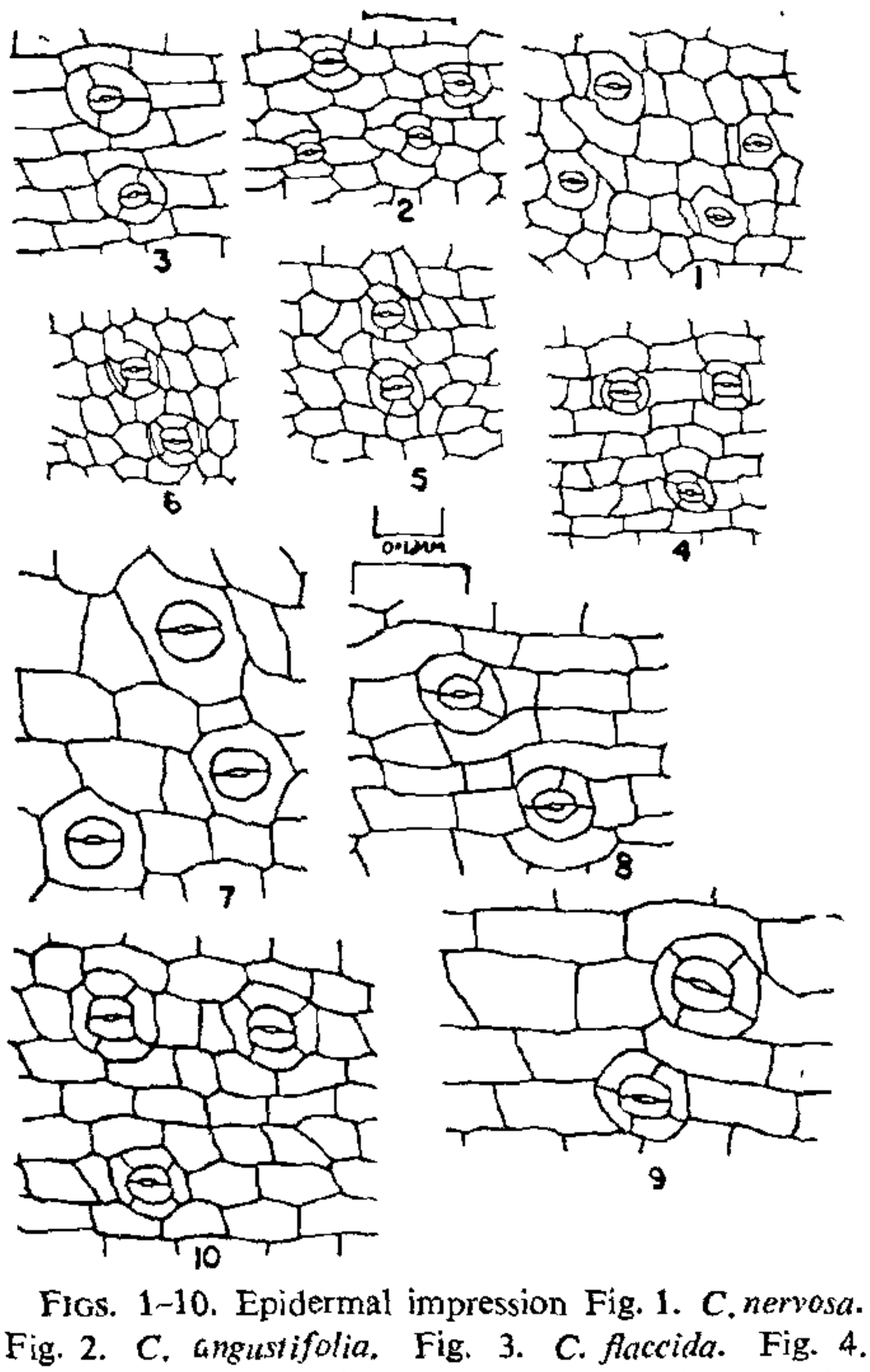
A PRELIMINARY EPIDERMAL STUDIES IN A FEW TAXA OF *COELOGYNE* (ORCHIDACEAE)

EARLIER investigators[1–4] on stomatal studies in Orchidaceae reported anomocytic type as common in this family. Even recently Withner *et al.*[5] reported the absence of subsidiary cells in orchids. Deviations from this are also reported by Metcalfe[6], Singh and Singh[7] and Williams[8]. Shah and Gopal[9] reported that their stomatal studies in monocotyledons, particularly on *Smilax*, *Ruscus*, *Yucca*, *Draecaena* and *Sanseviera* have substantiated inclusion of *Smilax* in Smilacaceae, *Ruscus* in Ruscaceae, *Yucca*, *Draceaena* and *Sanseviera* in Agavaceae. Further, their work also substantiated this conclusion of Hutchinson[10]. These authors also refer to the assumption that stomatal studies reveal phylogenetic sequence among the members of the family and that the stomatal types are constant within a family and even a genus. The above assumption and the literature on stomatal studies in this family being unsatisfactory, the present authors have undertaken stomatal studies of this family.

Ten species of *Coelogyne*, cultivated in National Orchidaria at Yercaud, and at the Indian Botanic Garden, Howrah, were selected. Epidermal impressions from both sides of the matured leaves, at base, middle and tip were taken, following the method described by Rao[11]. Camera-lucida drawings of the impressions were made and studied.

It is clear from these studies that the leaves are hypostomatic in these species. The following four types of stomata are observed (Fig. 1) : (1) Floating stomata in *C. nervosa*, A. Rich., and *C. mossiae*,



FIGS. 1–10. Epidermal impression Fig. 1. *C. nervosa*. Fig. 2. *C. angustifolia*. Fig. 3. *C. flaccida*. Fig. 4. *C. lentiginosa*. Fig. 5. *C. cristata*. Fig. 6. *C. ovalis*. Fig. 7. *C. mossiae*. Fig. 8. *C. ochracea*. Fig. 9. *C. elata* and Fig. 10. *C. occultata*.

Rolfe., (2) Paracytic stomata in *C. angustifolia*, A. Rich., (3) anisocytic stomata in *C. flaccida*, Lindl., and *C. ochracea*, Lindl. and (4) tetracytic stomata in *C. lentiginosa*, Lindl., *C. cristata*, Lindl., *C. ovalis*, Lindl, *C. elata*, Lindl., and *C. occultata*, Hook. f.

From this study of the epidermal cells a key is drawn as follows :

1. Stomata without subsidiary cells:
   2. Epidermis with uniform cells.....*mossiae.*
   2. Epidermis with a narrow rectangular cell adjacent to the stomata.....*nervosa.*
1. Stomata with subsidiary cells:
   3. Subsidiary cells 2.....*angustifolia.*
   3. Subsidiary cells 3 to 4:
      4. Subsidiary cells 3:
         5. Stomatal count per sq. cm at tip 3036 ± 399.....*flaccida.*
         5. Stomatal count per sq. cm at tip 7428 ± 391.....*ochracea.*
4. Subsidiary cells 4:
      6. Epidermal cells polygonal:
         7. Cells of the epidermis uniform.....*cristata.*
         7. Cells at right angle to the long axis of the guard cells are much smaller.....*ovalis.*
      6. Epidermal cells rectangular:
         8. Stomatal count per sq. cm at tip (high) 6857 ± 813.....*occultata.*
         8. Stomatal count per sq. cm at tip (low):
            9. Stomatal count per sq. cm at tip 2571 ± 392.....*elata.*
            9. Stomatal count per sq. cm at tip 3929 ± 788.....*lentiginosa.*

TABLE I

Stomatal count in Coelogynes (*Mean of five readings in sq. cm*)

Name	Place of cultivation	Tip	Middle	Basal	Stomatal index at tip
(1)	(2)	(3)	(4)	(5)	(6)
C. nervosa	National Orchidarium, Yercaud	3000±598	2892±762	2285±320	6·25
C. angustifolia	do.	7143±504	6714±814	8714±1370	12·5
C. flaccida	do.	3036±399	3071±685	2857±505	6·06
C. lentiginosa	do.	3929±788	3107±881	2428±392	7·00
C. cristata	do.	3786±583	3679±514	2857±504	8·33
C. ovalis	National Orchidarium, Indian Botanic Garden, Howrah	5000±505	5000±714	3428±319	9·00
C. mossiae	National Orchidarium, Yercaud	5714±504	3893±622	3714±597	14·28
C. ochracea	do.	7428±391	3571±714	2999±1060	6·67
C. elata	do.	2571±392	2284±599	1998±599	7·4
C. occultata	do.	6857±813	8000±930	5000±1128	8·65

Results of Table I indicate that generally the leaf tip comprises larger number of stomata than the base and the middle, with significantly less degree of deviations. However, in the case of *C. angustifolia*, the basal region shows larger number of stomata than the tip and middle. From these stomatal counts, the counts on leaf tip can be taken for standard stomatal counts,

The above studies help recognition of groups within a genus and probably may throw light on phylogeny among the species. Our observation in *C. ovalis* and *C. cristata* are similar to those reported by Singh and Singh[7]. This observation substantiates that the stomatal types are constant within a species. However, the stomatal counts in these species differ, probably because of studies from the peels[7], which on fixation

may contract and bring in more stomata within the same unit. *C. ovalis* plants were collected from Shillong by Singh and Singh[7] and also by the Botanical Survey of India, cultivated at Meerut and at National Orchidarium, Howrah. The variation of climatic factors of the above three places may also influence this aspect. However, this needs further experimental trial.

The authors are grateful to Dr. N. C. Nair, Deputy Director, Botanical Survey of India, Coimbatore-2, for encouragement.

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BASIDIOCARP FORMATION BY *VOLVARIELLA DIPLASIA* IN CULTURE MEDIUM

PRODUCTION of basidiocarps in agar medium by Basidiomycetous fungi is considered to be a significant contribution towards the study of nutritional requirement, morphogenesis and genetics of such fungi[3]. But it is rather a rare phenomenon among the Basidiomycetes to produce fruiting bodies in culture. It has been recorded for a few members of the family Agaricaceae[2,4] and some Polyporaceae[1,2].

In this laboratory, the culture of *Volvariella diplasia* (Berk. and Br.) Singer, is regularly maintained in oats agar medium (50 g oats, 1000 ml distilled water solidified with 2 % agar) as stock culture required for the production and distribution of spawns to mushroom growers. During November 1977, a lot of culture grown in 250 ml Erlenmeyer flasks on 50 ml of oats agar medium produced basidiocarps spontaneously. The basidiocarps were formed in abundance and the button stages could be observed sprouting out on the third day of subculturing. The basidiocarps expanded complerely on the fifth day (Fig. 1). The flasks were

FIG. 1. Stages in the development of basidiocarp of *Volvariella diplasia* on oats agar medium.

incubated at room temperature (22° to 32° C). The pileus formed on the culture medium measured on an average 5 cm in diameter which was smaller in size than those formed under natural habitat. In all other details they compared well.

A perusal of the literature revealed that this is the first record of basidiocarp formation by *Volvariella diplasia* on artificial culture medium. Further studies on the nutritional and environmental aspects which induced basidiocarp formation are under way.

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CHLORFLURENOL—A NEW PRETREATING AGENT FOR CHROMOSOME WORK

PRETREATMENT for the study of chromosomes is generally given for several reasons and the most important being to bring about scattering of chromosomes with clarification of constriction regions. Several pretreatment chemicals have been applied, for the purpose[1]. While working with chlorflurenol (2-chloro-9-car-