slightly curved, transversely multiseptate (usually 6). slightly constricted at septa, 16·5–60·5×2·5–4·3 μm.

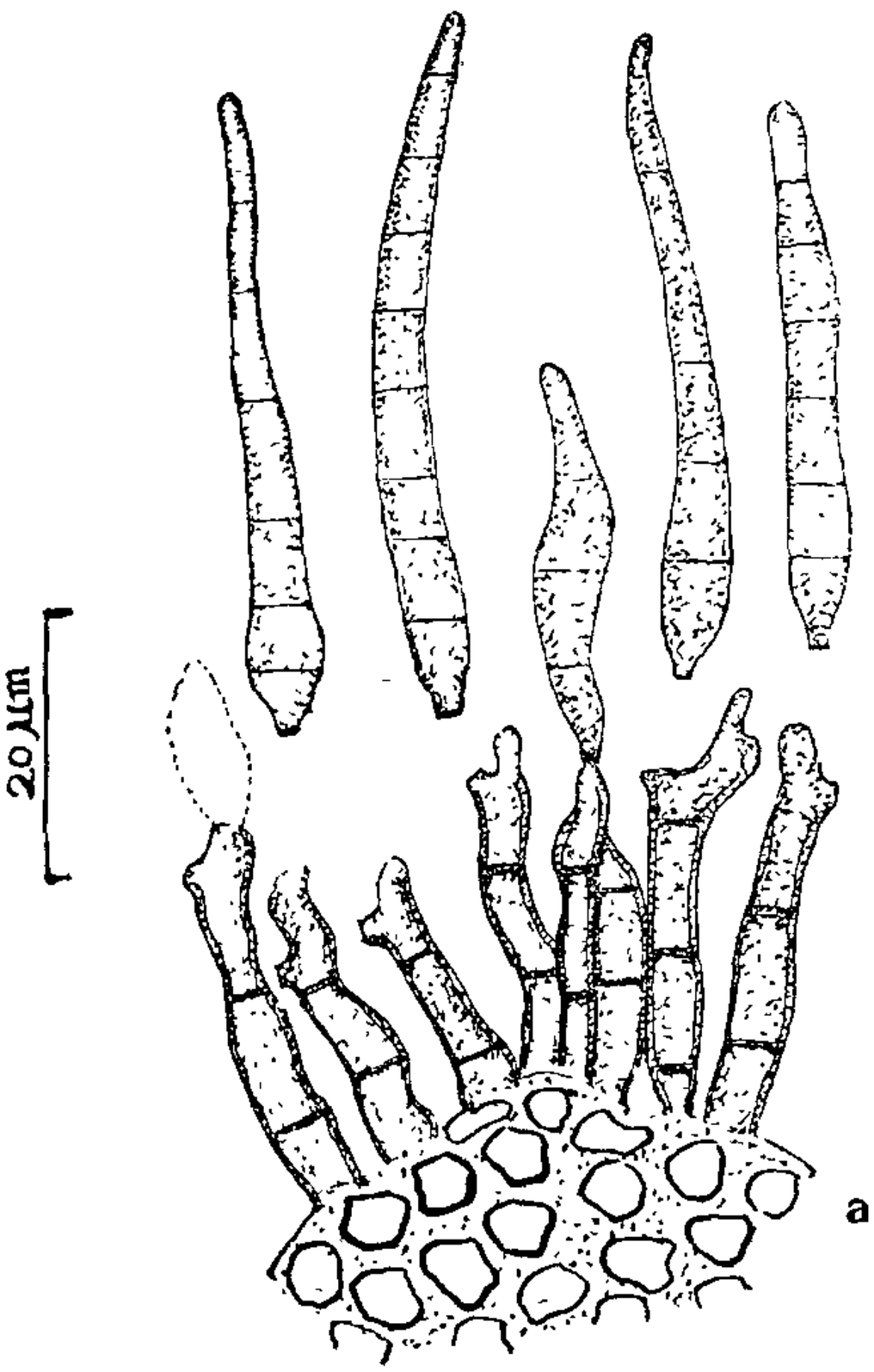

FIG. 1. *Pseudocercospora gymnematis* sp. nov. a, stroma; *b*, conidiphores and conidia.

On living leaves of *Gymnema tingens* W. and A. (Asclepiadaceae), Jan., 1978; Gorakhpur; leg. P. Kumar, 2; IMI 229183.

We are grateful to Dr. P. M. Kirk, CMI, for the identification of the fungus. Thanks are due to Prof. K. S. Bhargava, for providing facilities and to Dr. D. P. Rogers, for the Latin translation.

Mycology Laboratory,
Department of Botany,
University of Gorakhpur,
Gorakhpur, India,
August 17, 1978.

P. KUMAR,
KAMAL.

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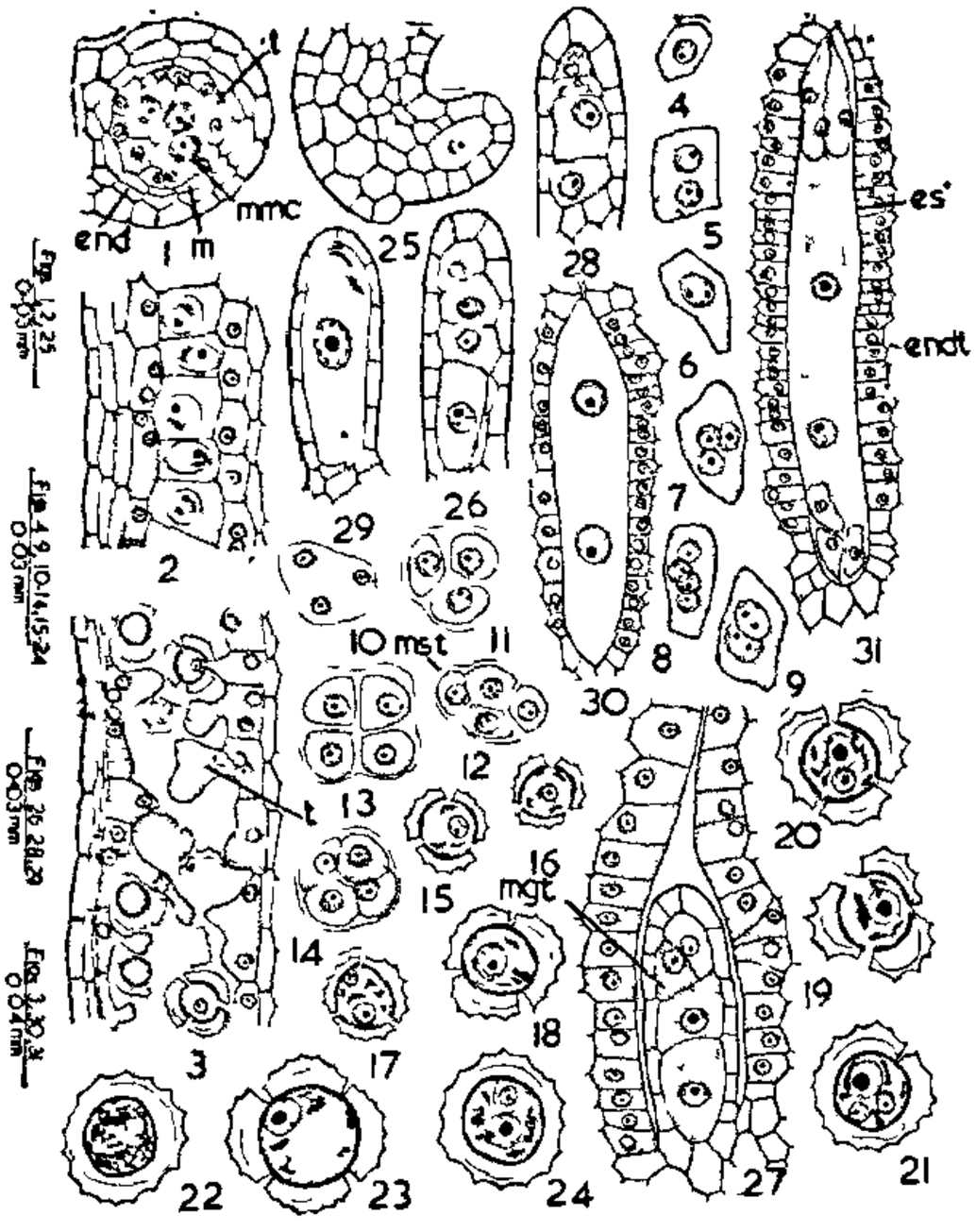
SOME EMBRYOLOGICAL FEATURES OF *EMILIA FLAMMEA* CASS.

THE family Compositae with about 900 genera and 13,000 species (Willis[8],) constitutes one of the largest families of the flowering plants, The composites are of unique interest, since, besides manifesting no less than five types of embryo sac developments (namely, Polygonum, Allium, Peperomia, Drusa and Fritillaria), they exhibit polyembryony, parthenocarpy and apogamy and even variation in synergids and antipodals. The available embryological information has been summarised from time to time by Venkateswarlu and Maheswari Devi[7], Davis[1] and Deshpande[3]. As far as is known to the authors the embryological data concerning the genus, *Emilia* Cass. is confined to *Emilia sonchifolia* (Sundara Rajan[6]). Therefore, it was felt desirable to work out the embryology of other species of the genus and the present communication concerns the structure and development of micro- and megasporangia, sporogenesis and gametogenesis in *Emilia flammea* Cass. (= *Cacalia coccinea* as quoted in Haines[4]), a common delicate erect herbaceous garden plant with scarlet homogamous heads. belonging to the tribe Senecioneae of Compositae.

The anther is 4–sporangiate. The archesporium differentiates in each lobe as a single row of hypodermal cells which divide periclinally to form an outer layer of parietal cells and large inner sporogenous cells. The cells of the parietal layer by periclinal and anticlinal divisions, form a wall of three layers circumscribing sporogenous cells (Fig. 1). The development of the anther wall from the parietal layer conforms to the Dicot type of Davis[1]. The secretory tapetum is 1-layered throughout and is at variance with the perioplasmodial condition reported by Sundara Rajan[6] in *Emilia sonchifolia*. By the time meiosis begins in microspore mother cells, the cells of the tapetum become enlarged and project into the anther locule as a balloon or finger-like processes (Fig 3), probably effectively nourishing the microspore mother cells and their derivatives. To begin with, the tapetal cells are uninucleate, but later become polyploid in consequence of nuclear divisions and fusions (Figs. 2–9). The tapetum, which is most active during meiosis, persists till about the formation of 2 or 3-nucleate pollen grains and subsequently breaks down and becomes absorbed *in situ*. The endothecium is hypodermal and regularly 1-layered and bears no fibrillar thickenings thereby resembling *Emilia sonchifolia* (Sundara Rajan[6]). The cells of the middle layer become stretched, flattened and crushed at maturity of the anther (Fig. 3).



FIGS. 1–31. *Emilia flammea* Cass. Fig. 1. T.S. Anther lobe at microspore mother cell stage showing wall layers and microspore mother cells. Fig. 2. L.S. A part of an young anther lobe; note the single layer of microspore mother cells. Fig 3. L.S. part of a mature anther lobe; note the tapetal cells. Figs. 4–9. Tapetal cells. Fig. 10. Cytokinesis in microspore mother cells. Figs. 11–14. Microspore tetrads. Figs. 15–24. 1, 2 and 3-nucleate pollen grains; note accumulation of coloured contents in pollen grains. Fig. 25. L.S. Ovule showing megaspore mother cell. Figs. 26–28. Tetrad of megaspores. Fig. 29. Linear tetrad of megaspores showing functional megaspore and degenerating megaspores. Figs. 30, 31. 2- and 8-nucleate embryo sacs.

(*end*: endothecium; *endt*: endothelium; *es*: embryo sac; *m*: middle layer; *mmc*: microspore mother cells; *mgt*: megaspore tetrad; *mst*: microspore tetrad; *t*: tapetum.)

In longisection, an anther lobe displays a single row of microspore mother cells (Fig. 2) which in transection (Fig. 1) is as a plate of two or three microspore mother cells. Cytokinesis in the microsporocytes is simultaneous (Fig. 10) and engenders tetrahedral, rhomboidal, isobilateral and decussate microspore tetrads (Figs. 11–14). But after separation, the microspores exhibit undulations of exine and which foreshadow the position of future spinous outgrowths of the exine of the mature pollen grains (Fig. 22). The uninucleate pollen grain (Figs. 15, 16, 18, 19) shows thick spinicent exine and thin intine. The 3–or 4-zonicolporate pollen grains are 2-or 3-celled (Figs. 17, 20, 21, 24) when shed and both conditions are observed in the anthers of open flowers. There is variation in the size of the pollen grains (Figs. 15–24); the smaller and larger ones showing an average of 11·8 and 15·4 microns. The pollen grains show accumulation of dark-coloured contents, a feature not described for *Emilia sonchifolia* (Sundara Rajan[6]).

The ovular primordium arises as a small protuberance on the massive basal placenta. Differential rates of growth of the primordium makes the developing ovule bend towards the direction of the placenta as a consequence of which the apex of the ovule lies parallel to the funiculus in the anatropous condition. The ovules, as in other composites, are unitegmic and tenuinucellate with a long micropyle and an integumentary tapetum. The nucellar cells disorganise by the time 1-nucleate embryo sac is formed in the ovule (Fig. 30). The integument, which differentiates at the base of the ovular primordium (Fig. 25), becomes sturdy and massive by about the time the ovule fully differentiates.

Usually a single hypodermal archesporial cell with prominent nucleus and dense cytoplasm differentiates (Fig. 25). A parietal cell is not formed. The megaspore mother cell enlarges appreciably and undergoes meiosis resulting in a linear tetrad of megaspores (Figs. 26, 28). T-shaped tetrads are also formed occasionally (Fig. 27). Earlier to the formation of megaspores the innermost layer of the integument becomes densely cytoplasmic and forms the endothelium (Fig. 27) which reaches its maximum development prior to the organisation of the embryo sac and keeps pace with enlarging embryo sac and remains 1-layered and 1-nucleate throughout as in *Emilia sonchifolia* (Sundara Rajan[6]), *Bidens biternata* (Deshpande[2]), *Carthamus tinctorius* (Maheswari Devi[5]), among others.

The non-functional micropylar megaspores degenerate and only the chalazal member functions (Fig. 29). This functioning megaspore enlarges at the cost of the surrounding nucellar cells. The megaspore nucleus undergoes three free nuclear divisions to engender an 8-nucleate embryo sac of the Polygonum type (Figs. 30, 31). The mature embryo sac is enlongated comprising an egg and two elongated non-hooked synergids at the micropylar end two polar nuclei and three 1-nucleate antipodal cells. The three antipodal cells are of equal size unlike the condition in *Emilia sonchifolia* (Sundara Rajan[6]), where the lower antipodal cell was the largest. The antipodal cells are ephemeral and dwindle before fertilisation. The two polar nuclei fuse at the time of fertilisation and the fusion nucleus thus formed is located below the egg.

We express our thanks and gratitude to Dr. B. S. M. Dutt for providing some of the references and Dr. Piratla N. Rao for the identification of the plant.

Department of Botany, Kakatiya University, Warangal (A.P.).
P. S. PRAKASA RAO*
K. T. SUNDARI,
L. L. NARAYANA.
August 19, 1978.

* Department of Botany, Nagarjuna University, Nagarjunanagar-522 510, Guntur Dist., Andhra Pradesh.

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A NEW SPECIES OF *KATAGNYMENE*

DURING the studies on the freshwater algae of Marathwada region of the Maharashtra State, the authors came across a species of *Katagnymene* differing in many respects from the three known species of the genus[1,2] and therefore described here as new.

Katagnymene maharashtrensis sp. nov. (Fig. 1)

Trichomes long, usually straight, not constricted at the cross walls; cells much shorter than broad, 1/5–1/8 times as long as broad, 9–10·5 μ broad, 1·3–2 μ long; gelatinous sheath diffluent, hyaline, nonstratified, 28–35 μ broad; end cell rounded without cap or calyptra.

In a pond, Shahapur (19–10–1976).

Collected by P. V. Ashtekar and kept in his collection No. 1103.

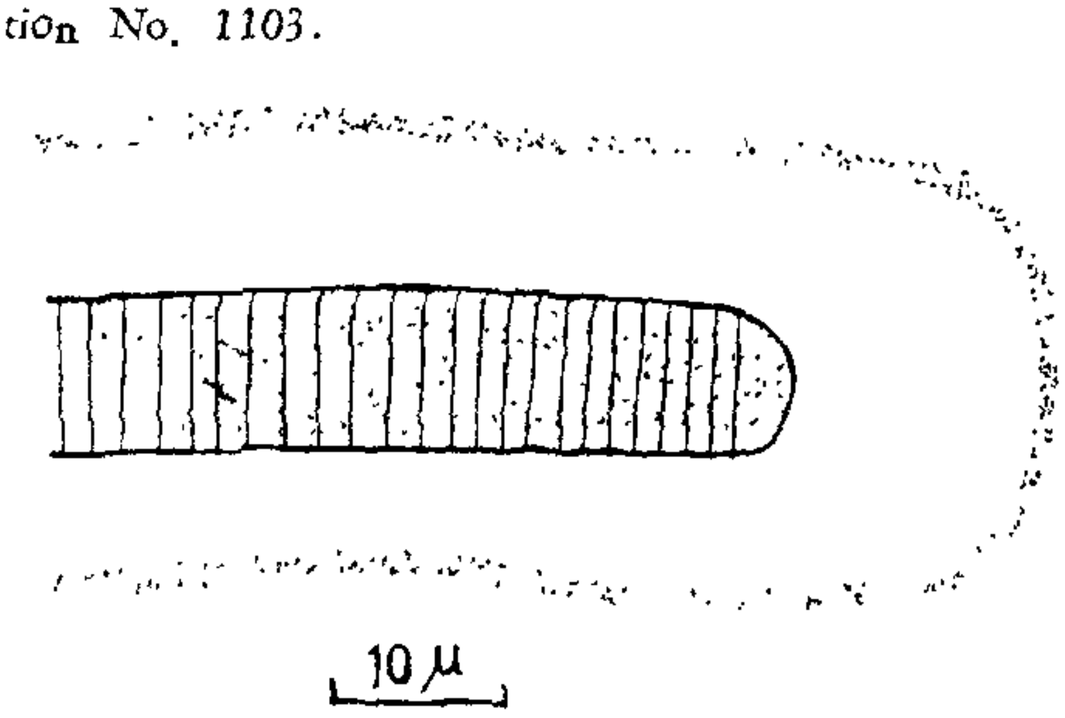

FIG. 1. *Katagnymene maharashtrensis* sp. nov.

Trichomata longa, vulgo recta, non-constricta ad septa transversa; cellulae multo breviores quam latae, 1/5–1/8 longiores quam latae, 9–10·5 μ latae, 1·3–2 μ longae; vagina gelatinosa, diffluens, hyalina, non-stratificata, 28–35 μ lata; cellulae terminalis rotundata, non-capitata, absque calyptra.

In lacu, Shahapur (19–10–1976).

Typus lectus a P. V. Ashtekar et positus in eiusdem collectione subnumero 1103.

So far only two species of *Katagnymene* have been recorded from the Indian Ocean[1] and this is the first record of the fresh water species from India and the second in the World[2].

Botany Department, Institute of Science, Aurangabad 431 001,
P. V. ASHTEKAR.
N. D. KAMAT.
September 4, 1978.

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EFFECT OF SEASONAL VARIATIONS, STARVATION AND COLD ACCLIMATION ON SERUM CHOLINESTERASE ACTIVITY OF COMMON FROG *RANA TIGRINA*

ALTHOUGH considerable amount of work has been done on this enzyme in homoeotherms[1-2], very little information is available on poikilotherms. Since the information pertaining to the influence of seasonal variations on this enzyme particularly in amphibians is meagre, an attempt is made to study the effect of seasonal changes, cold acclimation and starvation on the level of serum cholinesterase (ChE) in the common Indian frog *Rana tigrina*.

The methods of selection, feeding and maintenance of experimental animals were the same as reported earlier[3]. Cholinesterase (ChE) activity was determined as per Sigma Technical Bulletin (No. 420) which is based on the method of Rappaport *et al*[4]. The results are expressed in Rappaport Units/ml serum. One unit is equivalent to the hydrolysis of 1 μ Mole of acetylcholine in 30 min at 25° C. As reported earlier[5] the effect of cold acclimation was determined by keeping the frogs at 13° C, when the atmospheric temperature was 40° C.

As shown in Fig. 1, serum ChE increases from April with a peak in September. The lowest values are recorded in January. Cold acclimation of frogs upto 144 hrs is not observed to influence ChE activity significantly (0·5%). The starvation of the animals (Table 1) upto 30 days caused a gradual decrease in ChE activity from 10th day onwards and a direct relationship is observed between the period of star-