

continuous and larvae were prevalent round the year in soils with monoculture of rice.

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Cuttack 753006 (India),
February 24, 1978.

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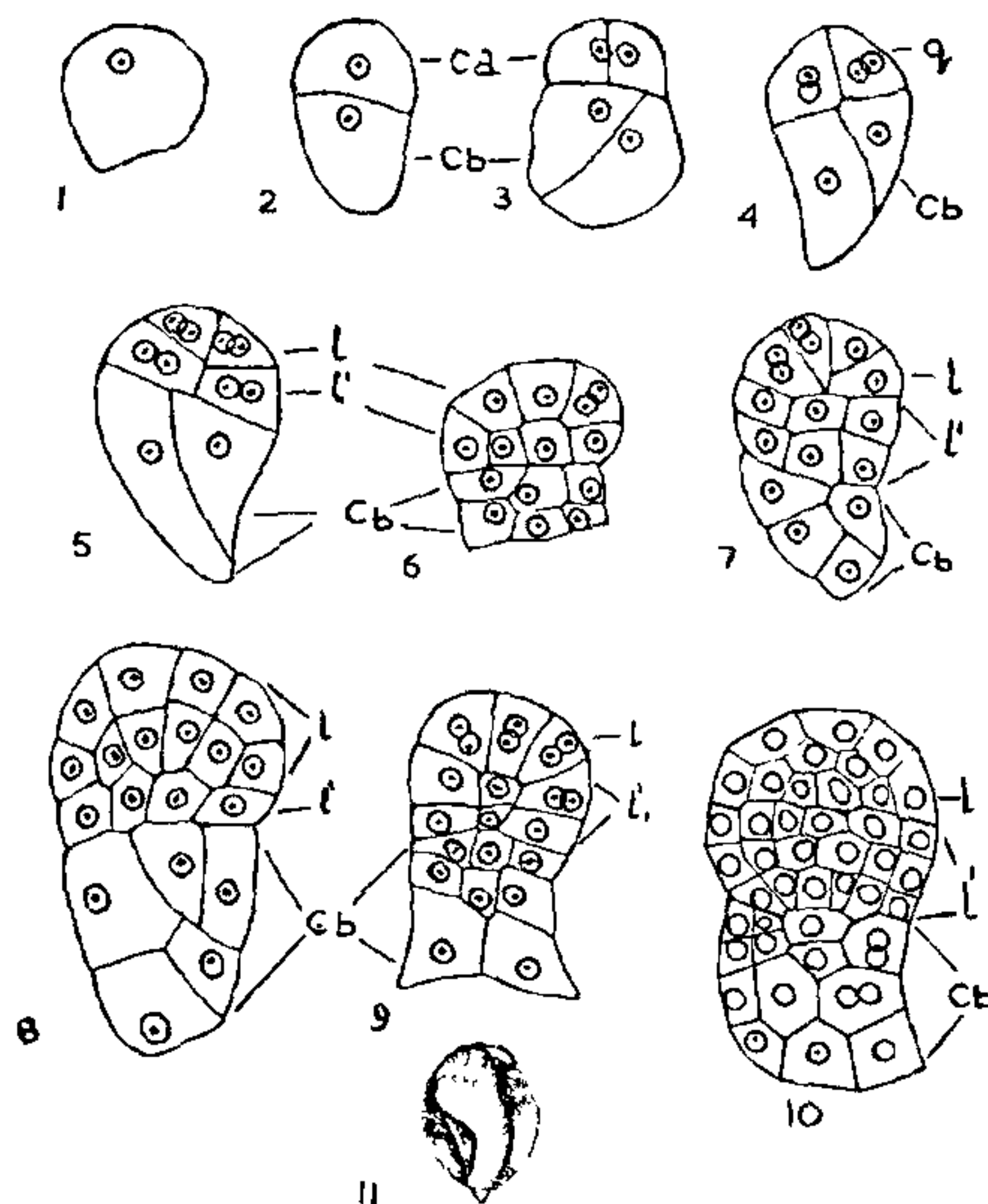
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EMBRYOGENY IN *GYROCARPUS AMERICANUS* JACQ.

THE embryo development in *Gyrocarpus* remains uninvestigated; hence a study was undertaken and reported here.

The fertilised egg enlarges and divides by a transverse wall giving rise to two superposed cells *ca* and *cb* (Figs. 1, 2). The cell *ca* divides vertically and *cb* by an oblique wall resulting in a tetrad of the A₁ category of Soueges (*vide* Crété¹) and the two juxtaposed cells of *ca* undergo another vertical division forming the quadrant *q* (Fig. 4). The cells of the tier *q* divide transversely forming the octant disposed in two tiers *l* and *l'* (Fig. 5). In some preparations the division in *cb* preceded that in *ca* and in others it is slightly belated. Further divisions in the tier *l*, although irregular, give rise to the stem apex and the two cotyledons, while those of the *l'* give rise to the hypocotyledonary part and hypophysis (Figs. 6-10). The cells of the tier *cb* divide rather irregularly forming a massive suspensor whose cells are highly vacuolated. The development of the embryo is referable to the

First Period, Series A, Megarchetype VI. In the mature embryo, the large cotyledons are convolute and enclose the plumule (Fig. 11), which shows the first leaf primordia.



FIGS. 1-11. *Gyrocarpus americanus* Jacq. Figs. 1-10 Stages in the development of embryo $\times 160$; Fig. 11, mature embryo showing convolute cotyledons \times nat. size.

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TWIN-POLLINIA IN *CEROPEGIA* LINN. (ASCLEPIADACEAE)

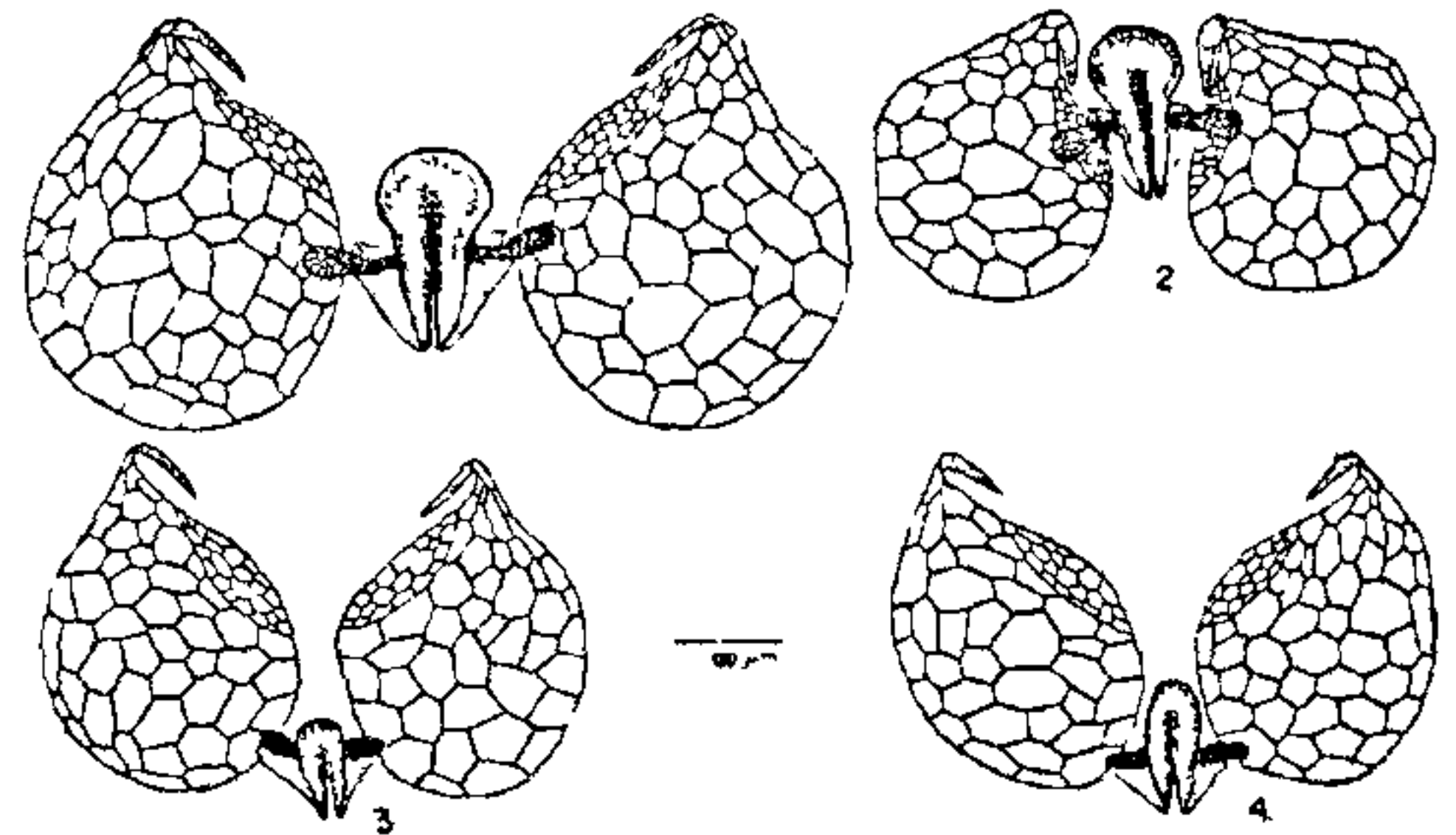
THE nature and importance of twin-pollinia of Asclepiadaceae was not mentioned in the works of earlier authors like Erdtman^{1,2} and Galil and Zoroni³. It was El-Gazzar and Hamza⁴ who utilized the palynological data for the classification of members of Asclepiadaceae. The present study was undertaken to evaluate the twin-pollinia data, in differentiating two species and two varieties of *Ceropegia* which are considered separate by some authors and merged by others.

In Huber's⁵ world monograph on the genus *Ceropegia*, *C. tuberosa* Roxb. is reduced to synonymy of *C. candelabrum* Linn. and *C. bulbosa* Roxb. var. *lushii* (Grah.) Hook. f. is merged with *C. bulbosa* Roxb. This nomenclature was maintained by Santapau and Irani⁶. On the other hand *C. candelabrum* and *C. tuberosa* are treated as distinct species based on the nature of corolla lobes by Stevens⁷. Raghavan and Ansari⁸ recognize the varietal status of *C. bulbosa* var. *lushii*, on the basis of the presence of distinct true breeding populations in nature.

The pollinia of the concerned taxa were processed according to the method of Franks and Watson⁹, by treating them with 5% KOH and later mounting in glycerine-jelly.

The twin-pollinia of the taxa are arranged one on either side of the stigmatic angle at the top, with the split end of the corpusculum facing downwards. The globose-pyriform pollinia are erect with their extra pollinial appendages incurved, facing the sterile region of pollinia. The appendages taper gradually to

in *C. bulbosa*, it is angular but rounded in var. *lushii*.



FIGS. 1-4. 1, *Ceropegia tuberosa*; 2, *C. candelabrum*; 3, *C. bulbosa*; 4, *C. bulbosa* var. *lushii*.

The average length and breadth of the pollinia and corpuscula were taken from five mounts each and their salient features are presented in Table I; all measurements are in μm .

TABLE I

	<i>Ceropegia candelabrum</i>	<i>Ceropegia tuberosa</i>	<i>Ceropegia bulbosa</i>	<i>Ceropegia bulbosa</i> var. <i>lushii</i>
Voucher number and Place of collection	Gaready T.M. Ramakrishna 1071	Mysore T.M.R. 1016	Sonnipally T.M.R. 1040	Sonnipally T.M.R. 1041
Length of Pollinia	260	330	270	285
Breadth of Pollinia	210	285	195	195
Shape of corpusculum (Head)	Semi-circular	Semi-circular	Angular	Rounded
Length of corpusculum (Entire)	135	165	90	105
Breadth of corpusculum (Head portion)	90	105	37.5	45

the pointed ends (Figs. 1, 3-4) except in *C. candelabrum* (Fig. 2) where they are slightly broader. The caudicles of *C. candelabrum* and *C. tuberosa* are elongated with blunt ends and ornamented on the surface. In both, a thin membranaceous structure covers half the length of the caudicles transversely and extends up to the apex of the corpusculum (Figs. 1-2). In *C. bulbosa* and *C. bulbosa* var. *lushii* the caudicles are simple without ornamentation, and show membranaceous structure covering the caudicle lengthwise, only partially; and extending up to the apex of the corpusculum (Figs. 3-4). The heads of corpuscula in *C. candelabrum* and *C. tuberosa* are semicircular and

The above data reveal that the pollinia and corpuscula are of great taxonomic significance for identification of the taxa up to the species level as pointed out by El-Gazzar *et al.*,^{4,10}. Apart from the size of pollinia, the size of corpusculum and its distinct appearance are quite significant. The extra pollinial appendage is slightly broader in *C. candelabrum* and it is not so in *C. tuberosa* indicating that the two are different. This is corroborated in the nature of corolla lobes which are shortly beaked in *C. candelabrum* and elongate spatulate in *C. tuberosa*⁷. On the basis of the present study, there is no justification in merging *C. tuberosa* with *C. candelabrum*. The pollinia and

corpusculum of *C. tuberosa* and *C. bulbosa* var. *lushii* appear alike, but they differ in their size by 15 μm . Further, the shape of corpusculum head in the former is angular while it is rounded in the latter. These features are significant for varietal distinction of the two taxa, thus supporting Raghavan and Ansari⁸.

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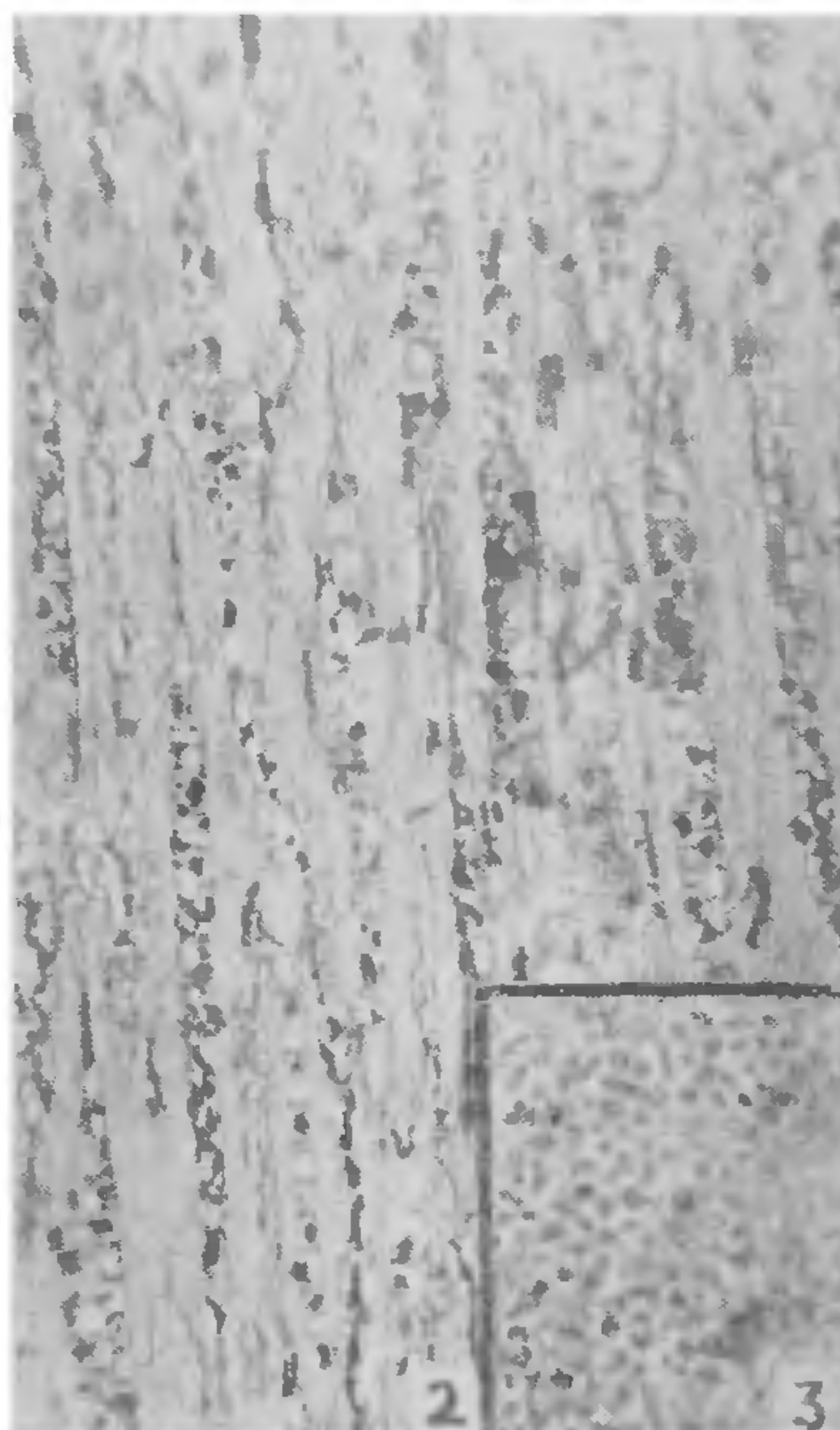
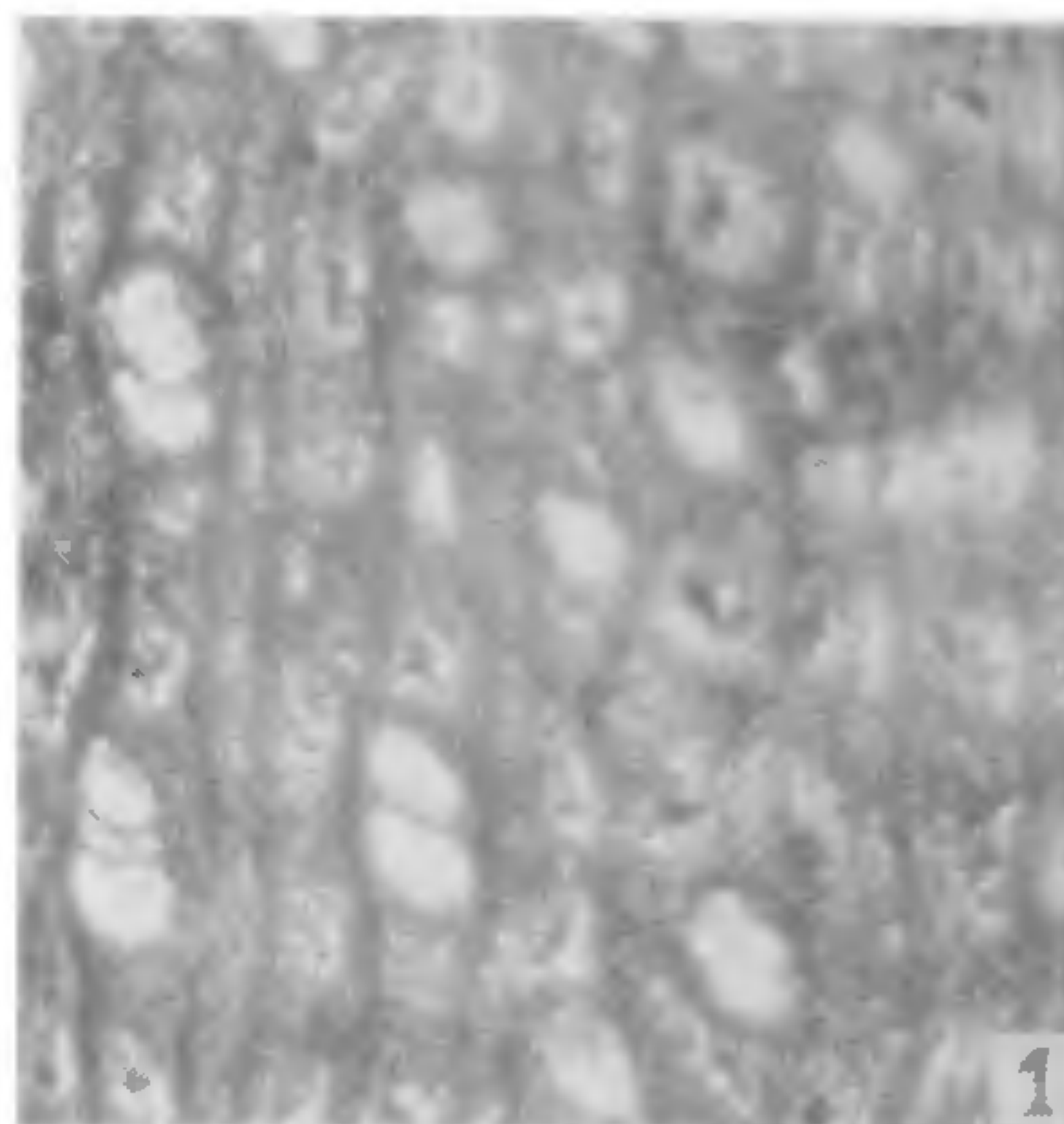
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CYNOMETROXYLON SIWALICUS N. SP. FROM THE SIWALIK RANGE

THE fossil wood described here comes from Kalagarh (29° 33' N, 78° 45' E) situated at the base of Siwalik range. It constitutes an addition to our knowledge of fossil flora from the Siwaliks. The anatomy of the fossil wood closely resembles that of *Cynometra* of Leguminosae and has therefore been referred to *Cynometroxylon* Chowdhury and Ghosh¹.

The diagnostic features of the fossil wood are as follows: *Wood*: diffuse porous. *Growth rings* absent. *Vessels* small to medium sized t.d. 70–120 μm , r.d. 130–175 μm , solitary and also in radial groups of 2–4, evenly distributed (Fig. 1), 10–20 per sq. mm, some vessels filled with gummy substance, vessel segments 300–400 μm long with truncate ends, perforation simple, intervessel pit pairs minute, alternate, bordered, polygonal with orbicular aperture (Fig. 3). *Parenchyma* both paratracheal and apotracheal, paratracheal vasi-



FIGS. 1–3. Fig. 1. Cross section showing the type and distribution of vessels and parenchyma, $\times 50$. Fig. 2. Tangential longitudinal section showing xylem rays, $\times 125$. Fig. 3. Tangential longitudinal section showing hexagonal orbicular inter-vessel pitting, $\times 480$.