(Ramalingam[4]). Hence it is of interest in the context to compare the haptor of oncomiracidium of *Axine* described by Bychowsky[5] and Euzet,[6] the haptor of post-oncomiracidium of *Axinoides* (collected along with juveniles, immature and adult *Axinoides* from this host species) with the haptor of post-oncomiracidium of *Pricea* and *Monaxine* (Ramalingam[2,4]) which reveals that in all these the haptor is bilaterally symmetrical. If the addition of clamps were to take place as in *Pricea* spp. (Ramalingam[4]) from the level of the posteriormost pair of larval hooklets, it is of interest to know how and in what manner formative zones of the bilaterally symmetrical haptor originally directed parallel to the long axis of the body become shifted obliquely either to right or left of the body during the transition from the post-oncomiracidial larva to juveniles with clamps.

The different stages in the development as represented by specimens with 2/2 clamps to 11/20 clamps in the haptor reveal that acquisition of clamps in the two rows is different and the sides having greater number of clamps also vary. Moreover, the position of the anchor-bearing languette with reference to clamp number from the hind end of worm also varies. These and other features of interest together with a description of post-oncomiracidium, juvenile, immature and adult *Axinoides* will be published elsewhere.

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A NOTE ON RECORD OF *COMPSOPOGON COERULEUS* MONT. FROM GUJARAT

Out of eight species of *Compsopogon* so far known to science three have been recorded from India.[2] They are *Compsopogon cœruleus* (Balbis) Mont., *C. hookeri* Mont. [Syn. *C. lividus* (Hooker) de Toni] and *C. iyengarii* Krishnamurty. Das, however, mentions that Indian Compsopogons are: *C. cœruleus* Mont., *C. lividus* (Hooker) de Toni and *C. indicus* Das.[1]

C. iyengarii Krishnamurthy is the only species previously recorded from Gujarat.[3] In this paper *C. cœruleus* (Balbis) Mont. collected near Lunawada (Panchmahal District of Gujarat State) is described.

Compsopgon cœruleus (Balbis) Mont. 1946

Thallus greenish-blue; attached to substratum by hold-fasts, about 15 to 40 cm. long. Main axis robust, about 1 mm. in diameter, tapering gradually towards the apex, corticate; central cells of the main axis large, surrounded by small polygonal cells; Branches many, multiseriate; distal ones uniseriate; cells of uniseriate branches discoid, 20–30 μ in width, 8–15 μ long. Only immature monosporangia observed.

The plant was collected from a pool near a river at Lunawada in December 1965.

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ROOTING OF MANGO CUTTINGS UNDER MIST

Attempts at propagation of mango (*Mangifera indica* Linn.) by cuttings have been made for more than a quarter of a century with little success notwithstanding encouraging effects of chemicals and pretreatments like ringing and etiolation on rooting of juvenile and invigorated shoots.[1–5] Mukherjee *et al.*[4] while successfully inducing rooting in cuttings from young mango plants found that cuttings from one-month old seedlings gave the highest percentage of rooting, but with increasing age of mother plants rooting was considerably reduced. They concluded: "At present it does not appear to be possible to raise cuttings of mango directly from mature plants." In experiments under intermittent mist that have been taken up in this laboratory during past one year, ringed hard wood shoot cuttings of mature mango plants have been found to root successfully (Fig. 1).

FIGS. 1-2. Fig. 1. Rooted mango cutting sixty days after planting. Fig. 2. Earthenware split pot showing roots coming out of the bottom slit.

One, two and three years old shoots on a 35-year old grafted mango tree (var. Himsagar), in full vigour and good bearing condition, were ringed in early June, 40-60 cm. from tip, depending on age of shoot. After 40 days the shoots were detached from the mother plant by giving a sharp slant cut through the callussed region above the girdle. The cuttings of each age group were treated in two ways, (*i*) control—"RC" planted as such and (*ii*) "RIBA" treated with IBA (2000 ppm quick dip followed by 5000 ppm in talc) before planting, in a 1 : 1 sand and moss mixture, in specially designed earthenware pots 20 × 8 cm., longitudinally split in two equal halves, held together with coir string (Fig. 2). This split pot device facilitated periodical observation on progress of rooting and transplanting of the rooted cuttings without much damage to the young roots. The pots were placed half sunk in sand in concrete propagation frames, fitted with automatic mist control unit, in a glass house. Sixty days after planting the cuttings were finally taken out and observations on their rooting performance made. The data are summarised in Table I.

TABLE I

Data on root formation in cuttings of three different categories of shoots (average of 20 cuttings under each category of shoot in case of RC, and of 10 cuttings per category in case of RIBA)

Treatment	Category of shoots	Percentage of cuttings rooted	No. of main roots per rooted cutting	Dry weight of roots per rooted cutting (in gm.)
RC	1-yr. old shoot	40	2·0±0·35	1·00±0·16
	2 ,,	60	3·5±0·20	2·08±0·08
	3 ,,	70	3·7±0·17	2·20±0·20
RIBA	1 ,,	50	2·0±0·28	1·60±0·21
	2 ,,	60	4·0±0·15	2·30±0·14
	3 ,,	80	3·8±0·15	3·00±0·13

In the present experiment cuttings from the older shoots have generally indicated better rooting which might be due to relative abundance of foliage in the older shoots of relatively bigger sizes resulting in enhanced beneficial effect of ringing. Earlier studies by Guhathakurta and Dutta,[1] Gardner and Piper[2] and Mukherjee *et al.*,[3,4] however, showed that cuttings from young and juvenile plants rooted better. They did not study rooting response of cuttings from shoots of different age from the same mature mother plant. Preliminary observations made in this laboratory (unpublished) indicate that under outdoor conditions older shoots (2-3 year old) with large foliage desiccate more quickly than young one-year old shoots with lesser number of leaves. It is considered that under intermittent mist when desiccation is prevented the larger foliage of older shoots exert greater root-promoting effects.

The results definitely indicate the possibility of clonal propagation of mango cuttings under mist.

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THE STOMATA OF *THELIGONUM CYNOCRAMBE* L.*

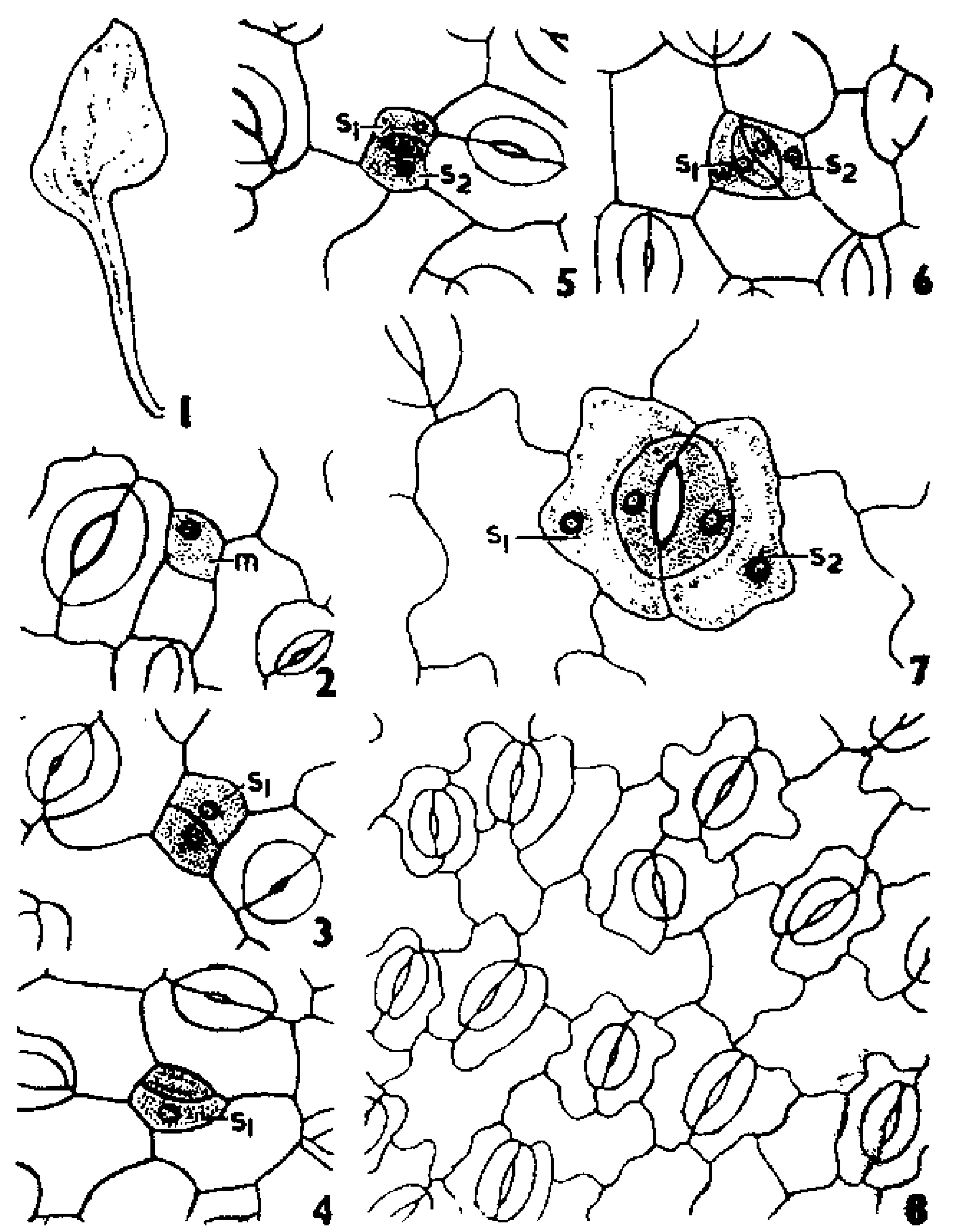
The genus *Theligonum* (*Cynocrambe* Tourn.) is the sole representative of the family Theligonaceæ. It comprises 4 species: *T. japonicum* Okubo and Makino, *T. macranthum* Franch., *T. cynocrambe* L., and *Cynocrambe formosana* Ohwi. Of these, *T. cynocrambe*, the Mediterranean taxon, has attracted much attention (See Schneider,[7] Gregson,[2] Paliwal,[5] and Kapil and Mohana Rao[3]).

The material on which this investigation is based was collected by the late Professor P. Maheshwari in 1961, from the Botanisches Garten, Institut für Systematische Botanik, Berlin, Germany. Formalin-acetic acid-alcohol was used for fixation.

T. cynocrambe is a succulent, monœcious annual. The leaves are borne alternately in the upper region whereas in the lower part of the stem they are opposite. They are petiolate, fleshy and oval with an entire margin (Fig. 1). As reported by Schneider (*See also* Metcalfe and Chalk[4]), the stomata are rubiaceous and occur on both surfaces of the leaf. The stomatal frequency, per unit area, ranges from 400* at the base to 271 in the apical region of the leaf; the Stomatal Index is 29 at the base and 38 at the apex.

The development of the stoma begins with the formation of a transverse septum on one side of a protodermal cell producing two unequal cells (Fig. 2). The smaller one functions as a meristemoid and these are irregularly scattered.

The meristemoid (*m*) enlarges and divides transversely or diagonally to the long axis of the initial. The daughter cells are unequal (Fig. 3) and the larger becomes the first subsidiary cell (S_1). The smaller cell again divides unequally and the larger daughter cell forms the second subsidiary cell (Fig. 4; S_2). Now a row of three cells can be recognized (Fig. 5); the central cell functions as the guard mother cell. At first it is smaller than the lateral cells but later enlarges and divides vertically and unequally and the daughter cells function as guard cells (Fig. 6). The two subsidiary cells are distinguishable from the other epidermal cells by their lateral position and smaller size. The mature stomata (Figs. 7, 8)



Figs. 1–8. *Theligonum cynocrambe*, development of stomata (*m*, meristemoid; S_1, S_2, subsidiary cells). Fig. 1. Entire leaf, × 4. Figs. 2–7. Ontogeny of stomata, × 176. Fig. 2. A meristemoid. Fig. 3. Division of meristemoid to cut off the first subsidiary cell (S_1). Fig. 4. Smaller daughter cell of the meristemoid in division. Fig. 5. Advanced stage, note the subsidiary cells and median guard mother cell. Figs. 6, 7. Young and mature stomata. Fig. 8. Epidermal peel showing distribution of paracytic stomata, × 88.

are, therefore, of the paracytic type. Since the guard cells and two subsidiary cells originate from the same meristemoid, the development conforms to the syndetocheilic