

Figures 1&3. Camera lucida drawings of left and right-handed seedlings of *Triticale* var. DTS-47-1 showing vernation of the seedling leaf.

Figures 2&4. Semi-diagrammatic representation of mature plants developing from the left and right-handed seedlings showing the disticous arrangement. The vernation can be clearly seen in the petiole region. Note also the handedness in spikelets.

plants, the percentage of left-handed flag leaves was less in *Triticale* (44%) and *Triticum* (29%) except in DTS-642 and in Kalyanasona. Left-handed plants similarly follow the sequence of LRLRLR—R. Rarely, however, the sequence gets altered to LRRLRL—L. In *Secale cereale* out of 25 neutral plants, 10 plants showed left-handedness and 15 plants showed right-handedness flag leaves (table I).

The folding of the first spikelet in most of the plants with right-handed flag leaves, showed right-handed first spikelets while the left-handed produces left-handed first spikelets (table I). The percentage of first spikelets folding to left-handed is higher in *Triticale* (72%) and 65% of left-handed flag leaves in right-handed plants in *Triticum*. It was also observed in left-handed plants that the high percentage of right-handed first spikelet in right-handed flag leaves of *Triticale* (78%) and *Triticum* (74%). Thus, the flag leaf and the first spikelet showed tendency for the R/L character. On the other hand, the second spikelet showed a strong tendency in the opposite direction

from that of the first one, while the third spikelet repeats the R/L character of the first one. These observations are comparable with those of Kihara *et al.*<sup>5</sup> who observed handedness in spikelets of Einkorn wheats.

According to Latting<sup>6</sup>, the vegetative and floral meristems are fundamentally alike and accordingly the leaves and floral organs have homologous structures. In the light of this observation the handedness in subsequent leaves, flag leaves and in first spikelets presently observed represent mirror image not only at the seedling stage but also at the maturity. It is thus obvious that the handedness in the flag leaves and spikelets represent stereo-isomeric forms and constitute a case of bio-isomerism<sup>7,8</sup>. Further work on the handedness of seedlings and successive leaves as also spikelets in relation to grain yield would give a better understanding of the naturally occurring variation.

We thank Dr M. G. Joshi, IARI, New Delhi; Dr M. Sarwar, CIMPO, Bangalore and the Director, Andhra Pradesh Agricultural Research Station, Warangal for supplying the seeds investigated.

25 March 1982; Revised 7 September 1982

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## FOLIAR MACROTRACHEIDS IN *ILEX DIPYRENA* WALL. (AQUIFOLIACEAE)

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DURING the course of detailed systematic investigation on the idioblasts, after clearing the leaves by the customary process<sup>1</sup>, the authors came across an interesting occurrence of macrotracheids<sup>2</sup> at the very tips of the free veinlets in the leaves of *Ilex dipyrena*



Wall. which was not reported previously in this genus.

The macrotracheoids are previously named as big-sized tracheoids or large sized tracheoids or enlarged terminal tracheoids<sup>3</sup> and are not much reported in Angiosperms as regards the other types of foliar tracheoids. These are reported in *Salicornia*<sup>4</sup> (Chenopodiaceae) *Xanthophyllum*<sup>5</sup> (Polygalaceae), *Cyrtandra*<sup>6</sup> (Gesneriaceae), *Vochysia*<sup>7</sup> (Vochysiaceae) and *Pogonophora*<sup>8</sup> (Euphorbiaceae) of dicots and in certain orchids (Orchidaceae) *Sansevieria* (Agavaceae) and *Crinum* (Amaryllidaceae) of monocots<sup>2</sup>.

So the findings of macrotracheoids at the free veinlets in the leaves of *Ilex dipyrena* Wall. is a characteristic feature, (figures 1 and 2) which after observing several specimens collected from time to time from different localities found as a constant character in

this species [Sikkim, H. Hara & Party 616 (KATH); Uttar Pradesh, Mundali, L. Delanongere 13 (DD); West Bengal, Darjeeling, Without any collector's name, 13 (CAL); Nepal, Thuloo Pokhari, Herb. Med. Pl. Kathmandu, 6827 (KATH); Arunachal Pradesh, R.S. Rao 1718 (ASSAM); Uttar Pradesh, Mundali, K. C. Sahni 26760 (DD); Uttar Pradesh, Mussoorie, Biswas 272 (DD)].

These cells are ovoid to ellipsoidal in shape, big-sized tracheoids like idioblasts, distributed only in terminal positions as also observed in *Xanthophyllum*<sup>5</sup>. Structurally these are with spiral thickening, compactly arranged and having broad lumen, showing a very distinct terminal attachment. The cell counts are usually 15–20 in each tip of free veinlets and appear in group in close juxtaposition, ranging from 100–120  $\mu\text{m}$ .

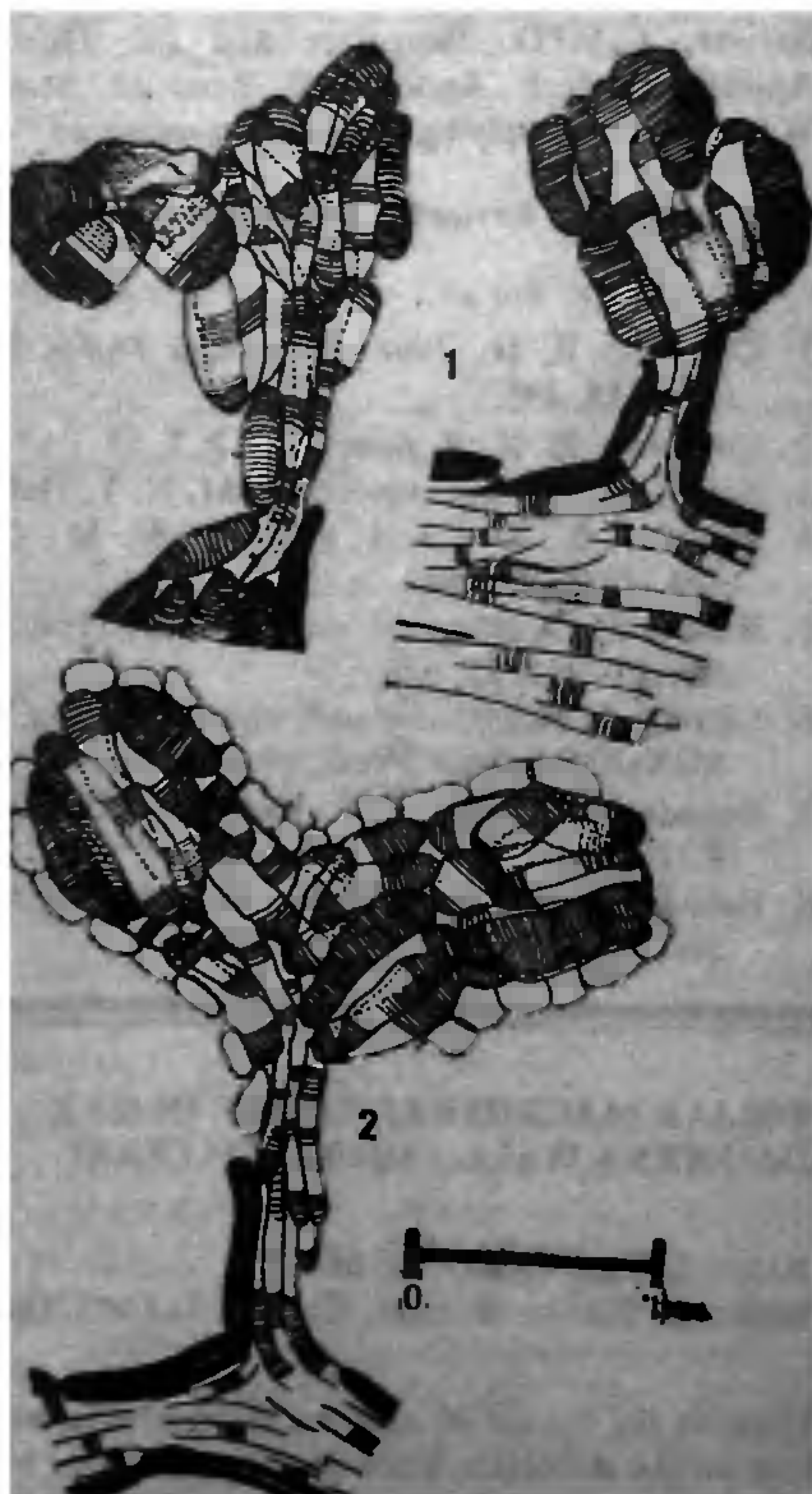
Both the gymno- and angio-macrotracheoids<sup>2</sup> are present in this species, as the free vein-terminations, are either naked or covered with barrel-shaped to rounded parenchymatous sheath cells.

Further, it is evident from an analysis of venation pattern of the cleared leaves that except the free-veinlets, the midrib and the other reticulations of nerves are always in association with scattered sclerenchymatous sheath cells resembling to vermiform and filiform sclerieds<sup>9</sup>.

So, anatomically *Ilex dipyrena* Wall. bears a distinctive character for its easy detection from the other Indian species of this genus.

The authors are grateful to the authorities of herbaria of India as well as of the Herbarium of Medicinal Plant Institute, Kathmandu, Nepal, for providing specimens for this study.

17 May 1982



**Figures 1 & 2.** 1. Gymnomacrotracheoids and 2. Angiomacrotracheoids.

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