S E C T I O N I V

ECOLOGY OF *RIVINIA HUMILIS* LINN.

CHAPTER 10

TAXONOMY, DISTRIBUTION AND MORPHOLOGY

10.1. Systematic Position

Rivinia humilis Linn. is a member of the family Phytolaccaceae.

10.2. Distribution

The distribution of R. humilis in India and other countries according to the various authors is presented in Table 10.1.

As it has been already pointed out in Chapter 1, this plant is abundant in certain parts of L. V. Palace compound, viz. Navlakhi area, especially the area round about the Navlakhi Vav - at Baroda. The plant has been successfully cultivated by the present author in the Botanical Garden of the M S. University at Baroda, and now it has thoroughly naturalized there. The present author has observed it growing abundantly also in a private Orchard at Surat.

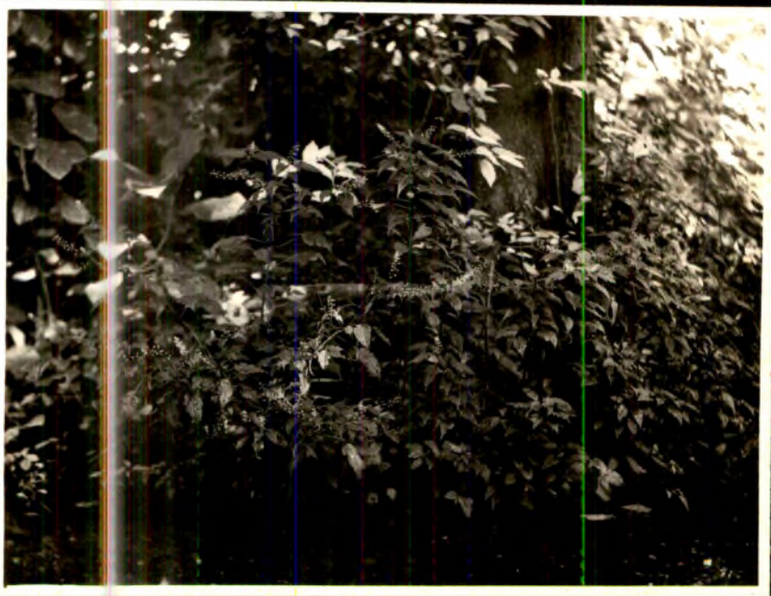
10.3. Habit and Habitat

It is an erect, evergreen perennial herb, shrubby at base. It attains a height varying from 45 to 100 cm.

It grows in moist, humus-rich soil in shaded localities

PLATE No.

a.



b.

PLATE No. 20.

under the shade of trees, under hedges, at the foot of walls, often along the sides of irrigation channels.
Plates 19 and 20.

10.4. Morphology

Root - It is a tap root system with well developed lateral roots.

Stem - The stem is branching in a forked manner, the branches are spreading and shrubby at the base. The stem is pubescent when young.

Leaves - The leaves are membranous, dark green, 5 to 10 cm long and 2.5-4 cm broad, simple, alternate, slender-petioled, ovate ovate-lanceolate or cordate-ovate, acuminate, with entire or somewhat crenate margin, and more or less hairy; stipules minute and caducous.

Inflorescence - It is slender, many-flowered raceme, erect or pendulous, about as long as or longer than leaves, axillary or terminal.

Flowers - The flowers are small, hardly 1 cm long, white with pale rose calyx and impart a whitish rose colour to the whole raceme. The flowers are hermaphrodite, rather reflexed.

Perianth - The perianth is uniseriate, 4-parted; calyx corolla-like, pale-rose; segments obovate-oblong, obtuse, concave, and persistent. The petals are absent.

Androecium - Stamens 4, shorter than calyx, alternating

with the calyx lobes; the filaments distinct, the anthers 2-celled, dehiscing longitudinally.

Gynaecium - Pistil - 1, unilocular and uniovulate; the ovary superior and ovoid; placentation basal; the style shorter than ovary, slightly curved, and persistent; the stigma - 1, peltate.

Fruit - The fruit is a berry with coloured juice. It is small, globular, pea-shaped, 3-3.5 mm in diameter, crimson red or bright scarlet in colour, with a small persistent style near its apex. The perianth lobes and the filaments of the stamens, mostly without anthers, also persist as greenish structures. The berries during their maturation and ripening exhibit a range of colours in succession as follows :

green - pearl white - light rose - dark rose - red.

The berries are borne in clusters and after ripening fall to the ground.

Seed - The mature seed is black, biscuit-shaped, about 2 mm in diameter, and is very hairy. The hilum is present on one side in a shallow depression, and hairs are absent around it. The seed has abundant endosperm enveloped by the embryo.

Common English Name - Rouge Plant, Blood-berry.

It is named as Rivina (Rivinia) in honour of A. Q. Rivinus 1691- 725, Professor of Botany at Leipzig (Bailey, 1958).

Local name - Safed Dhani.

Plates 21 and 22.

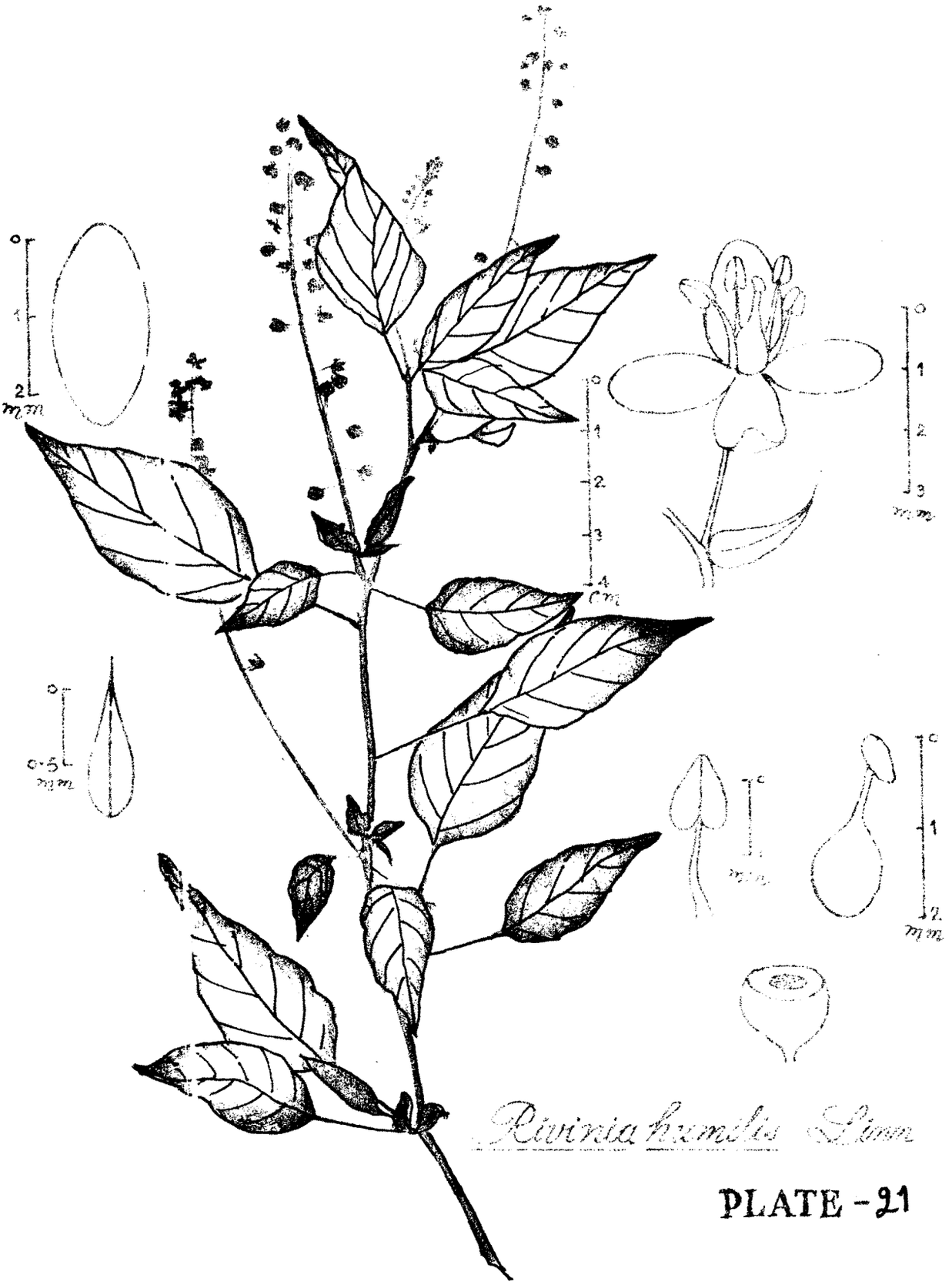


PLATE - 21

a.

b.

PLATE No. 22.

10.5 Economic Importance

It is commonly cultivated for its red berries. It is an evergreen perennial bloomer, bearing delightful berries, and is a highly distinctive object of ornamentation in a garden, particularly in its fruiting stage.

This shrubby herb is ideal for planting in rock pockets (for rockeries). The branches bearing bright-coloured berries are effective for schemes of interior decoration (Jindal, 1970).

10.6 Phenology

The seeds of R. humilis have no dormancy period and can germinate any time during the year, if favourable conditions are available. However, large-scale germination of seeds takes place in nature soon after a few showers of rains during June-July. The seedlings which come up during the period, finding optimum conditions for plant growth, grow at a very rapid pace and attain a luxuriant appearance by the beginning of August. Flowering starts when the plant is 7-8 weeks old. Flowering continues almost throughout the year in flushes, and fruiting occurs in succession.

10.7. Anatomy

The important anatomical features of the root, stem, petiole and leaf of R. humilis, and the ecological adaptations therein are as follows :-

Root :- Epidermis - one-layered, replaced very early by phellem. Phellogen - arises in the hypodermal region. Cork - several layers thick consisting of cells with lignified walls. Secondary cortex - few-layered, parenchymatous. Cortex - several layers thick, parenchymatous, cells containing abundant starch grains. Endodermis - not well defined. Secondary phloem - small in extent. Secondary xylem - well developed, consisting largely of parenchyma and fibres; vessels few, solitary or in groups, scattered; rays uniseriate. Primary xylem - tetrarch.

Plate - 23.

Stem :- Epidermis - Outermost layer, outer walls with a thin layer of cuticle, stomata present. Hypodermis - several layers thick, consisting of alternate patches of collenchyma and chlorenchyma. Cortex - narrow, 3-5 layers, parenchymatous. Endodermis - well defined, wavy in outline, cell walls slightly thickened. Pericycle - few layers, alternate patches of parenchymatous and sclerenchymatous cells. Secondary phloem - small in extent. Secondary xylem - limited development of secondary xylem, not forming a continuous band, confined to vascular bundles only, in some places lateral fusion of secondary xylem of the neighbouring bundles occurs. Primary xylem - endarch. Pith - occupying a very large area, parenchymatous, cells thin-walled and large.

Plate - 23.

Petiole :- Epidermis - outermost layer. Hypodermis - 3-5 layers of collenchyma. Ground tissue - parenchymatous, cells thin-walled and large, sphaeraphides occasionally present. Vascular bundles - 3 in number, arranged in an arc.

Plate - 24.

Leaf :- The leaf is dorsiventral. Epidermis - Single layer on both surfaces, cells unequal in size, outer walls with a thin layer of cuticle; the cells of the upper epidermis larger in size than those of the lower epidermis, irregular in shape and with highly undulating walls in surface view; the epidermal cells on the lower surface comparatively smaller in size, irregular in shape and with highly undulating walls in surface view; stomata confined to the lower surface, in general level with the epidermal cells, dispersed irregularly, of ranunculaceous (anomocytic) type; 2-3-celled uniseriate hairs present especially in and near the mid-rib region on both surfaces. Palisade tissue - one-layered. Spongy tissue - 2-3 layers, cells very loosely arranged.

Mid-rib region :- Hypodermis - one- or two-layered, collenchymatous, present only towards the lower surface. Ground tissue - parenchymatous. Vascular bundle - crescent-shaped, one large bundle formed by lateral fusion of few bundles.

Plates - 23 and 25.

The important ecological adaptations in the anatomical

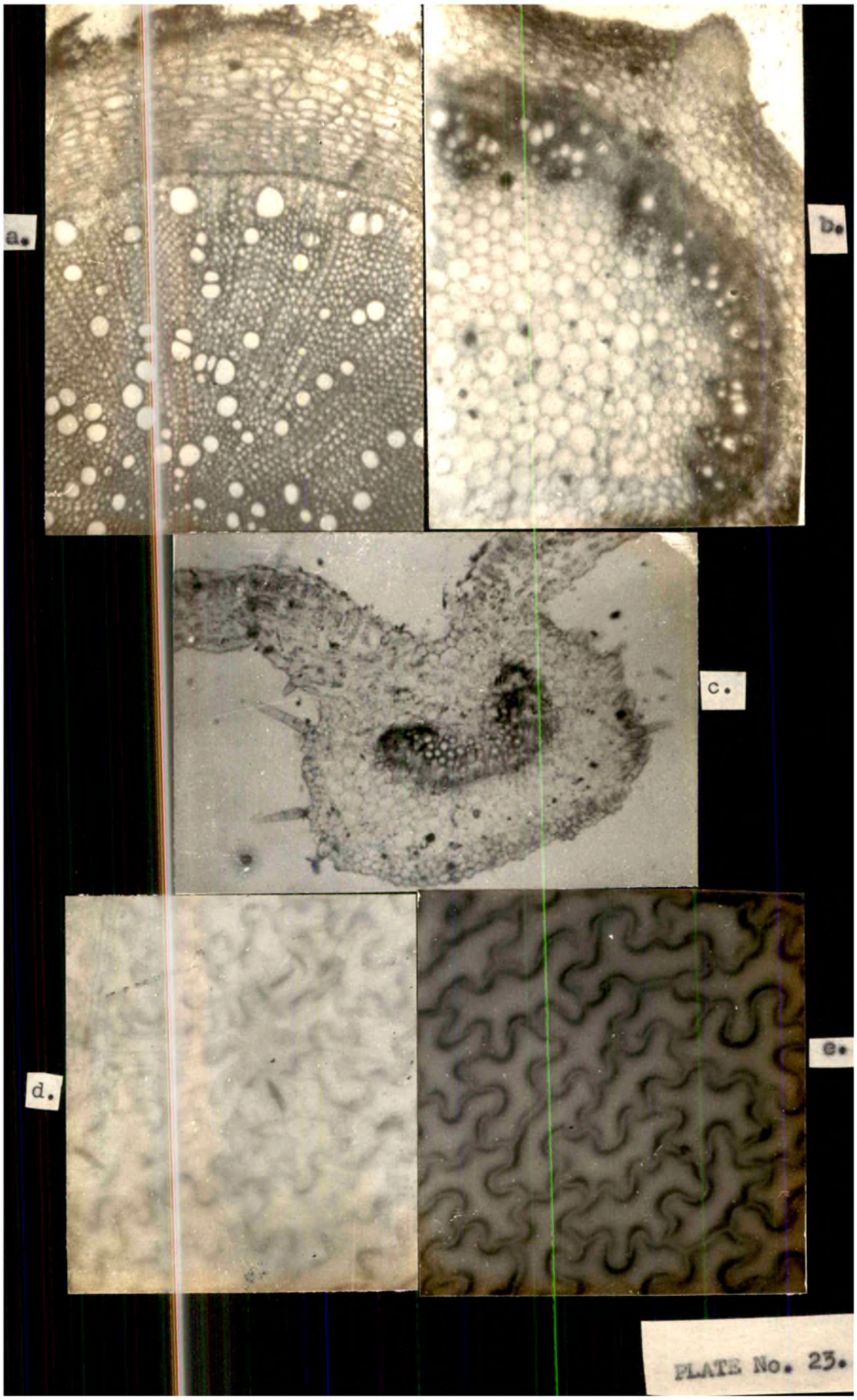
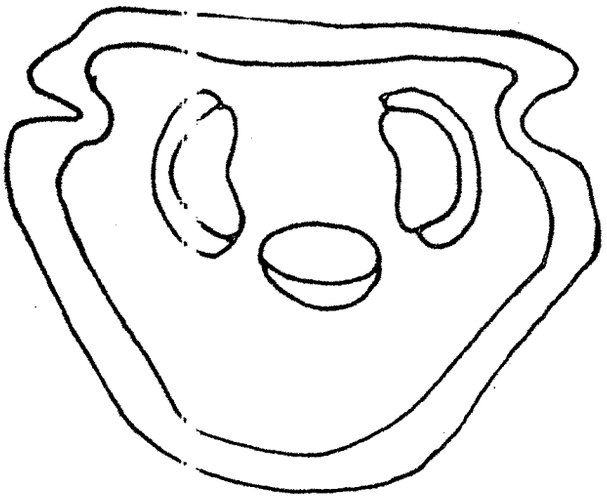
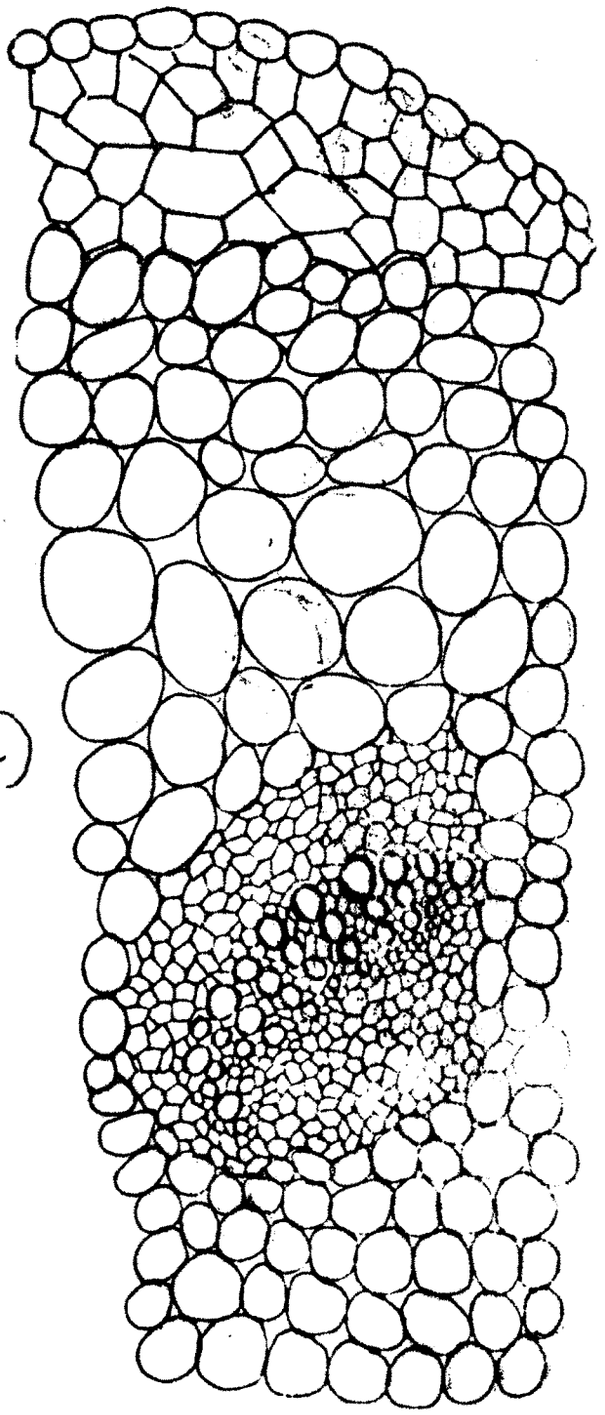


PLATE No. 23.



CROSS-SECTION OF PETIOLE (DIAGRAMATIC) (×50)

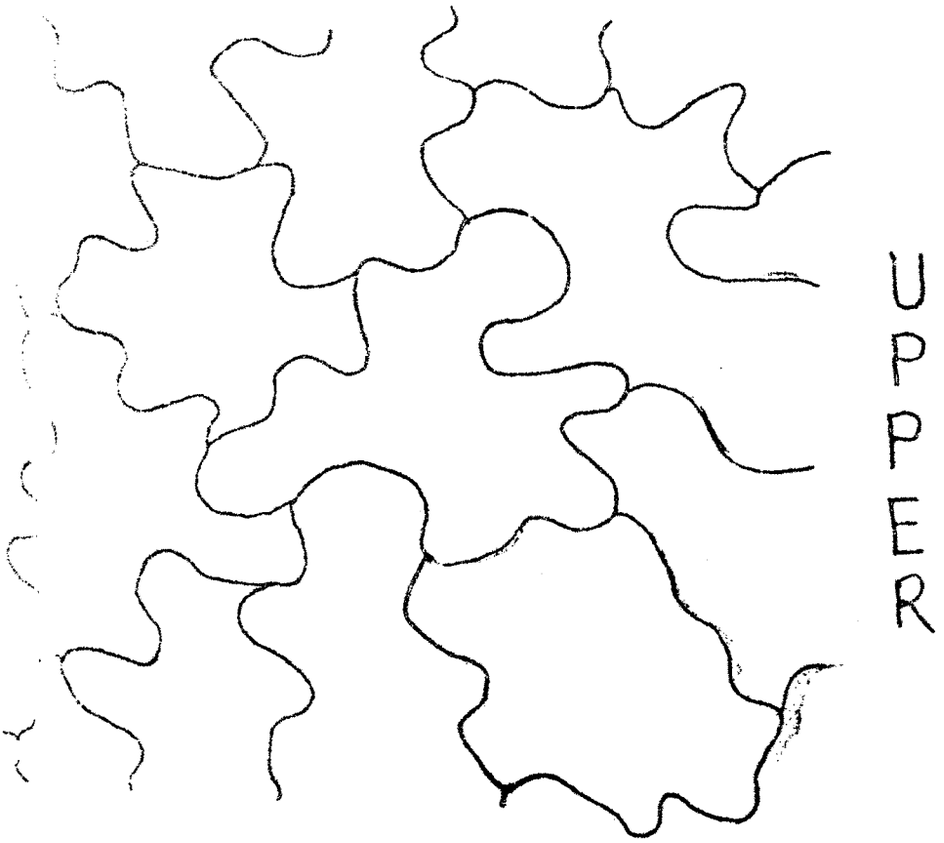


SEGMENT OF CROSS-SECTION OF PETIOLE (×225)

R. HUMILIS

PLATE 24

R. HUMILIS



EPIDERMIS OF LEAF IN SURFACE VIEW
(×675)

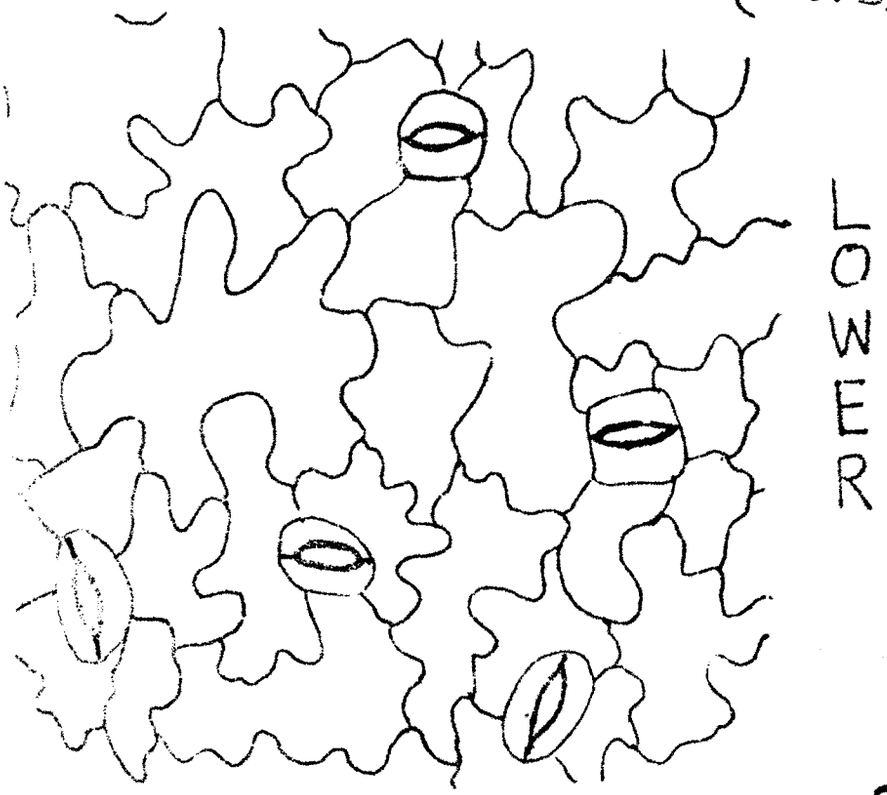


PLATE 25

features, suggesting the sciophytic nature of the plant are as follows :-

(i) Thin cuticle, (ii) Lateral walls of the epidermal cells highly undulating, (iii) stomata in general level with the epidermal cells, (iv) stomata confined to the lower surface suggesting the shady moist habitat, (v) palisade tissue one-layered, (vi) poorly developed mechanical tissue system, (vii) vascular tissues also poorly developed.

10.8. Stomatal Index

The stomata are confined to the lower epidermis. The stomatal frequency and index on the lower surface of a mature leaf of R. humilis were determined and are given below :-

Region of leaf	Average number of stomata/ sq. mm	Average number of epi. cells/ sq. mm	Stomatal Index
Upper Epidermis			
-	absent	-	-
Lower Epidermis			
Apical	107.02	617.54	14.77
Middle	121.05	612.28	16.51
Basal	89.47	615.79	12.69

The data indicate that the stomatal frequency and index

are not constant in the entire region of the leaf, but exhibit variation in the apical, middle and basal regions. They show maximum values in the middle region, and minimum in the basal region.

10.9. Chromosome Numbers

The haploid and diploid chromosome numbers for R. humilis Linn. as reported by Sujura (1936), Joshi (1936) are n = 54 and 2n = 108 respectively.

The diploid chromosome number was confirmed by the present author from his study of the root-tip material.

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