

PHARMACOGNOSTIC STUDIES ON DROSERA ROTUNDIFOLIA LINN.

VIKRAMADITYA, PARASNATH VARMA AND HARISHCHANDRA GUPTA*

ABSTRACT: Microscopic studies of *Drosera rotundifolia* Linn. (Droseraceae) have been done to lay down anatomical characters of different parts including the drug in powdered form to help identify and quality control. The study establishes presence of actinocytic stomata; large sinuous thick-walled secretory cells with cellular inclusions; large, dark brown parenchyma cells with broad oval thick-walled pits; tracheids with conspicuous reticular thickenings; glandular trichomes with large multicellular stalk traversed by secretory ducts.

INTRODUCTION

Anatomical features on the plant parts, viz. pedicel, stem and different tissue elements in the powdered drug of entire plant have not been reported so far. Metcalf and Chalk⁷ had reported anatomical characters only of leaves and petiole but the type of stomata present were not reported earlier. Williams, S.E. *et al*⁸ and Ragetti *et al*⁹ though studied tentacles of few species of *Drosera* yet they did not report on type of tissue elements in this species.

Patterns of arrangement of tissue elements in pedicel and stem of the plant have been studied in detail in the present investigation.

The plant is a perennial insectivorous herb growing up to 25 cm high, with leaves rounded, in rosette on long hairy stalks, upper surface covered and fringed with long crimson glandular hairs which entrap insects. Scape slender, erect, leafless, simple or branched. Flowers in summer, in July-August, on a naked scape, 5-15 cm high, in one side raceme nodding at the top where the opening flowers appear as terminal. The plant is distributed in Europe, North America, and North Asian countries⁶.

In Homoeopathy² the preparation of plant is used in spasmodic cough with frequent spell of harking, violent itching, while the extract is used together with colloidal silicates in cases of arterio-sclerosis⁴.

The plant material was obtained from two different sources and were identified^{1,2,3}. For cross section studies, tissue was revived using 2.5% aqueous sodium hydroxide solution for two days, washing thereafter thoroughly with water. This was followed by usual method of dehydration using histokinette with different grades of ethyl alcohol, clearing by xylene and embedding in paraffin and bee wax (2:1). Sections were obtained, using Erma rotary microtome at 15-20 μ in thickness. For powdered studies, the material was treated with 2% aqueous potassium hydroxide solution, thoroughly washed, teased, stained with 1% aqueous safranin and mounted in glycerol. Mea-

* Homoeopathic Pharmacopoeia Laboratory (Government of India), Central Government Offices Complex, Ghaziabad-201 001.

surement of different tissue elements were recorded to standardise length, breadth and diameter of tissue elements. The powdered plant material was free of fungal infection.

OBSERVATION

Microscopy: In transection, mesophyll in leaves contained elongated, oval parenchyma cells. While the pedicel in cross-section (fig. 1) was oval in outline with the uppermost zone 3-4 layers of brown elongated suberised cells followed by a wide zone of ground tissue with a central hollow, ground tissue being composed of sclerenchyma cells in the upper half, while in the lower half thick-walled sinuous parenchyma cells; 4-5 vascular bundles, each being cylinder of tracheary elements and a few parenchyma cells. Phloem was ill defined.

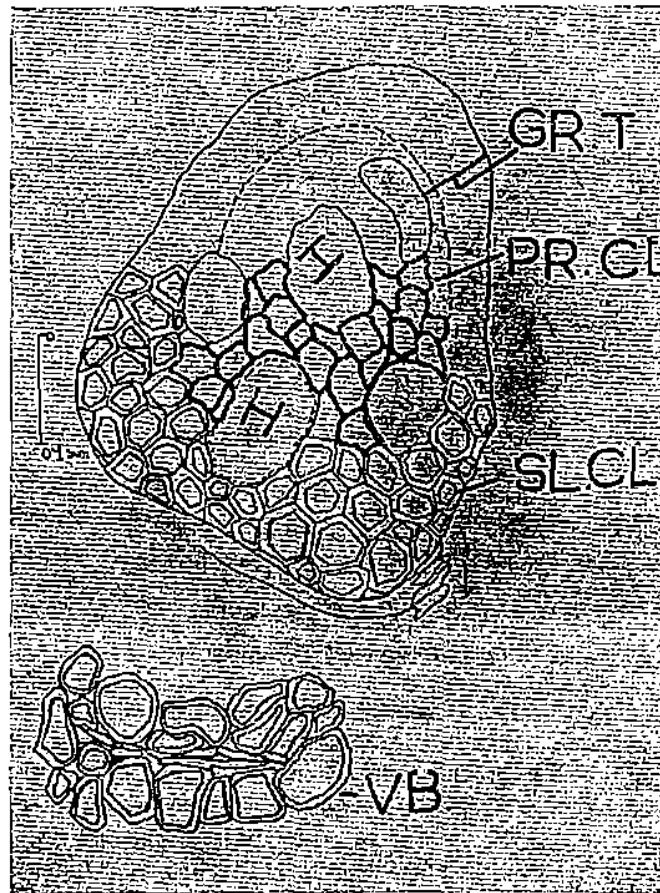


Fig. 1: *Drosera rotundifolia* L. Pedicel in cross section.

Stem in cross-section (fig. 2) contained ruptured epidermis; cortex 4-6 cells wide with large oval, highly thick-walled sinuous, loosely arranged cells bearing lignin; endodermis single layered at places; conjoint, collateral vascular bundles in a ring; phloem 2-3 cells wide lacking in some bundles.

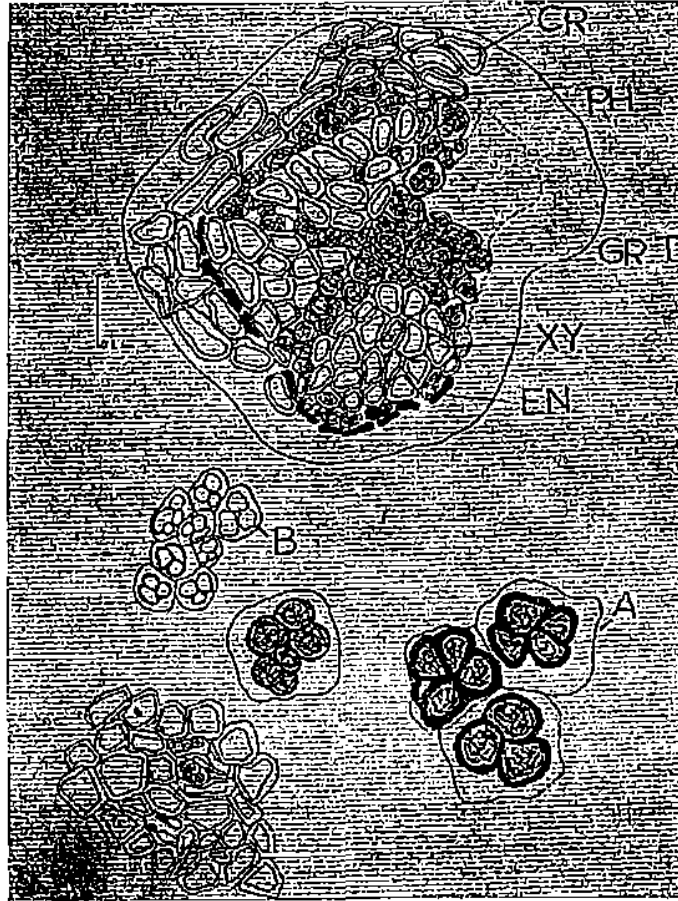


Fig. 2: *Drosera rotundifolia* L. Stem in cross section.

xylem with broad tracheary elements and a few parenchyma cells; and the ground tissue containing broad isodiametric, oval parenchyma cells with large cellular inclusions, cellular inclusions being most often surrounded by a brown tenaciferous substance, sometimes giving lacunar appearance.

Powdered drug: The powdered plant (fig. 3) contained tracheids with conspicuous reticular thickenings, 60-140 μ by 24-35 μ ; actinocytic stomata (fig. 4) 44-55 μ in diameter; secretory ducts in abundance (fig. 5), large thick-walled, sinuous secretory cells with large lumen and inclusions (fig. 6).

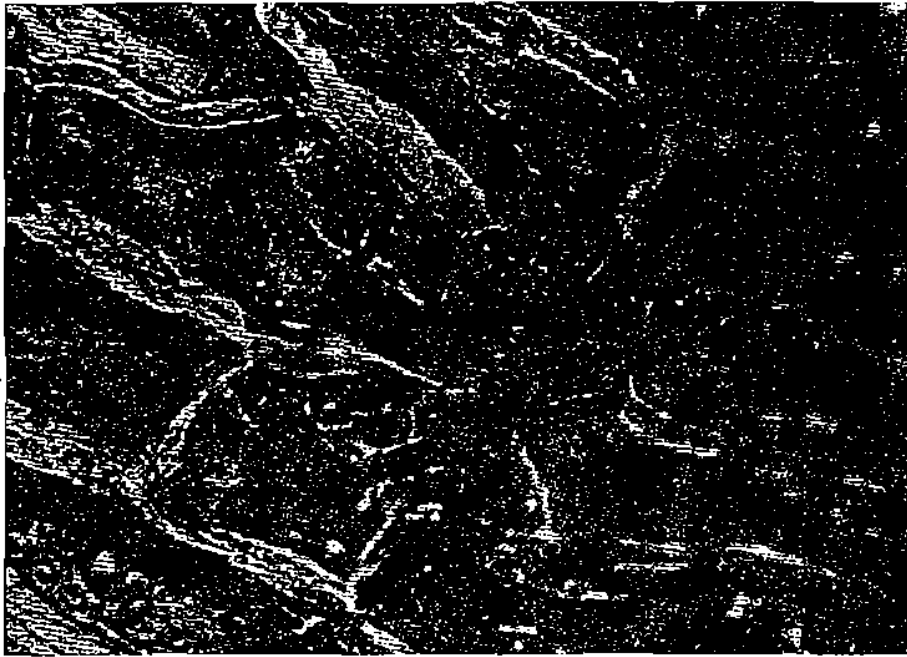


Fig. 4: Actinocytic stomata (400 x)

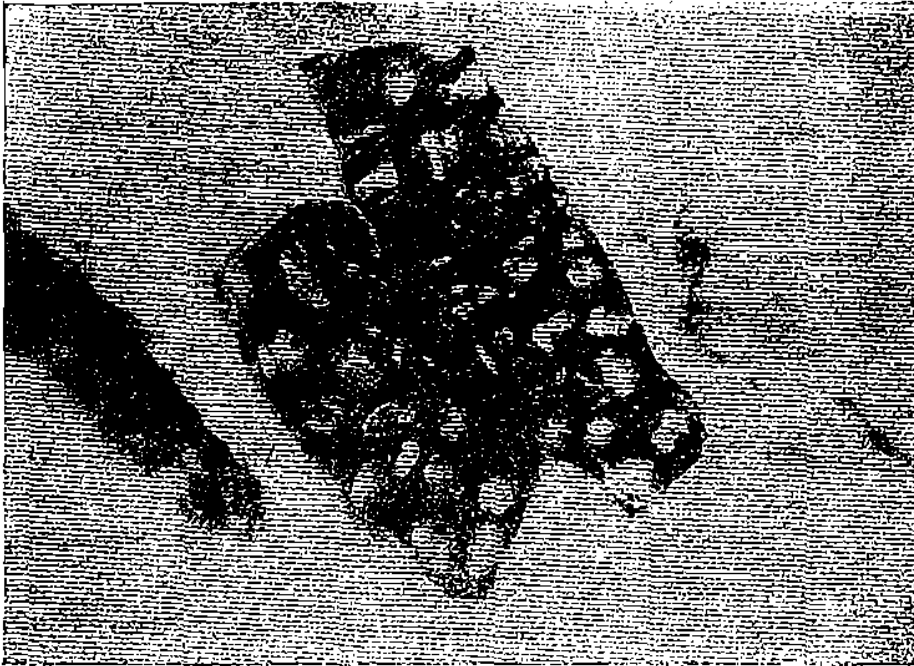


Fig. 3: Tracheids (400 x)

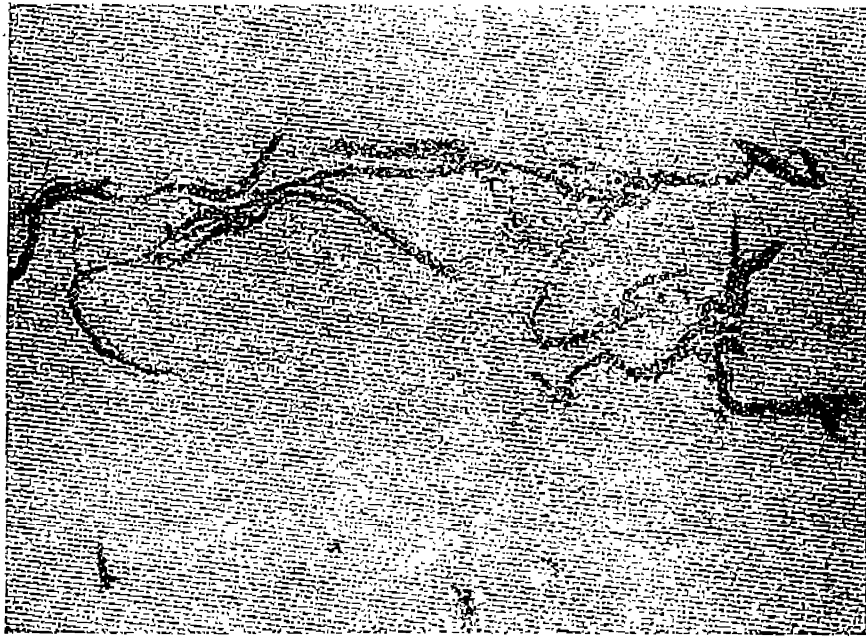


Fig. 6: Secretory cells (400 x)

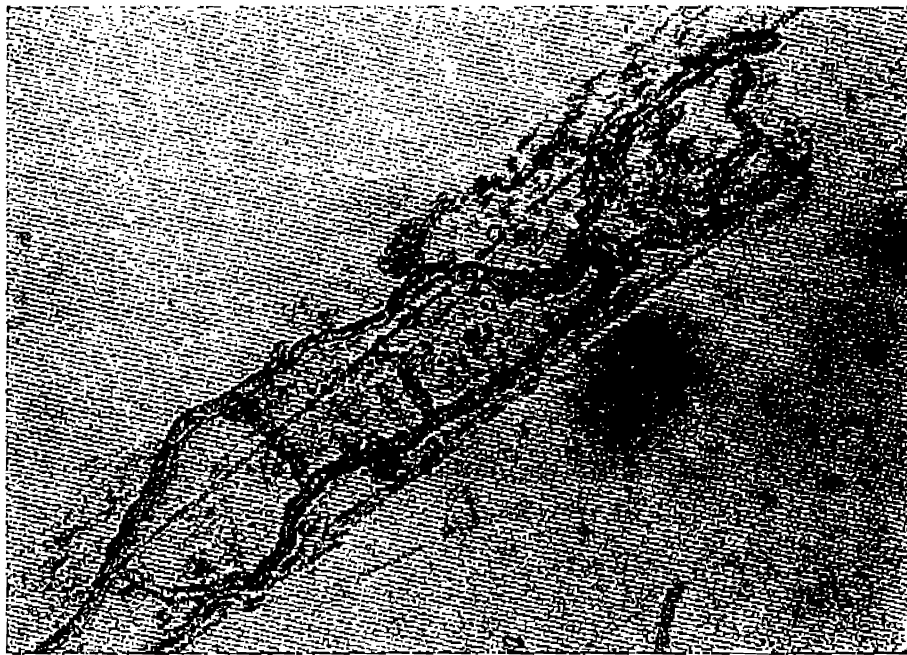
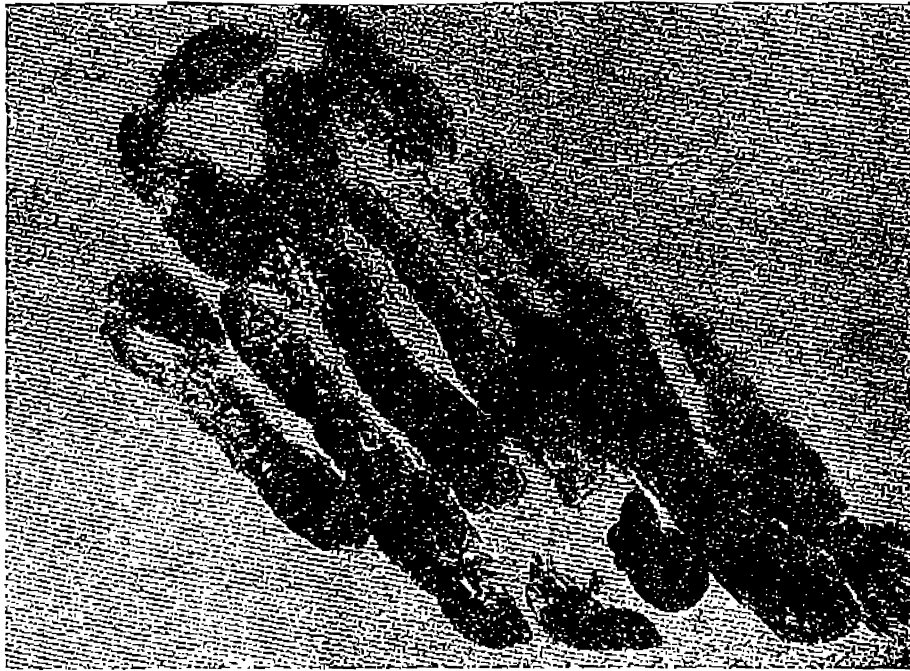


Fig. 5: Secretory ducts (400 x)



7B



7A

FIG. 7a & 7b: Parenchyma cells (400 x)

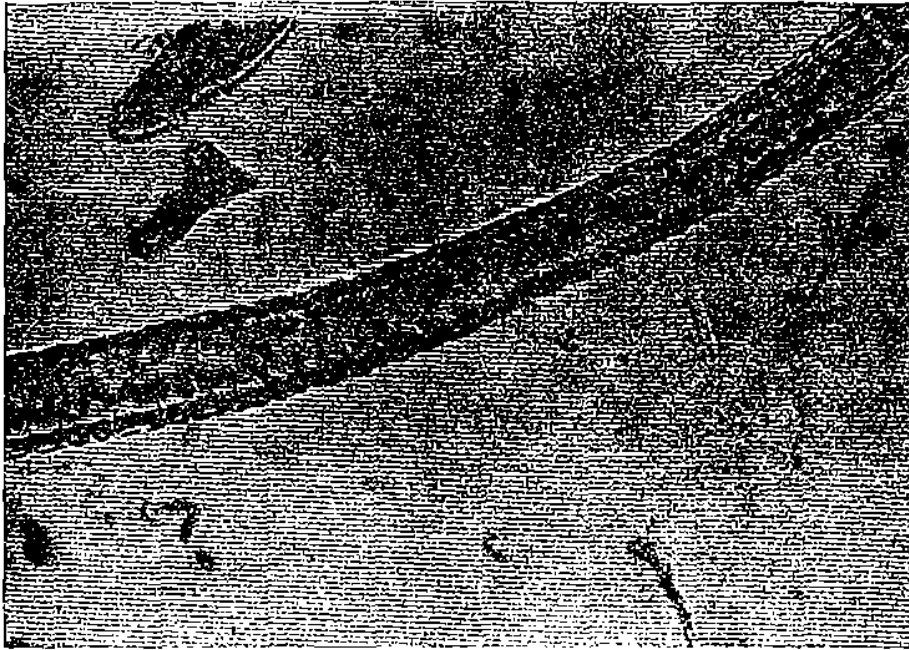


Fig. 9: Simple pitted Vessels (400 x)

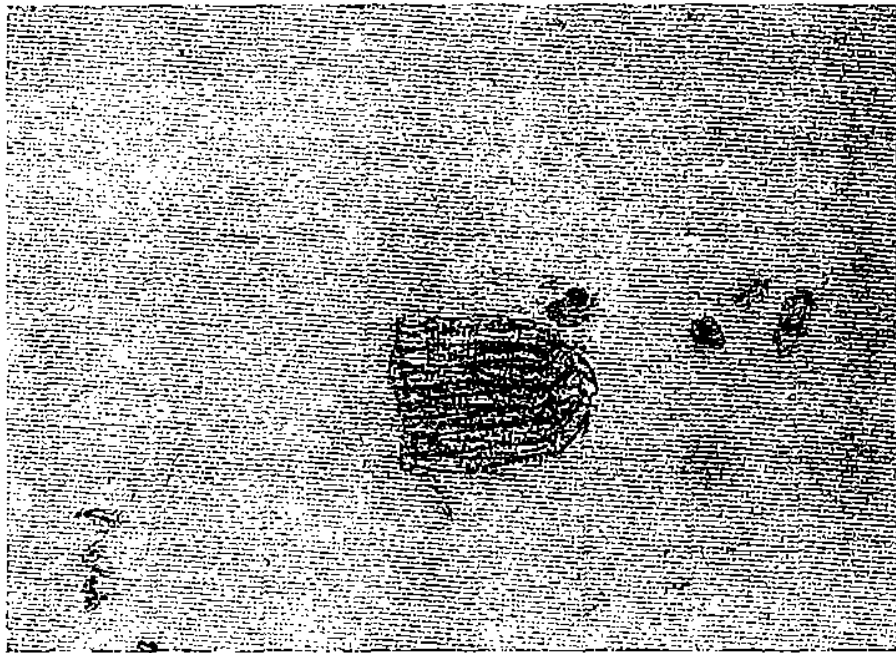


Fig. 8: Head of the glandular tentacle (100 x)

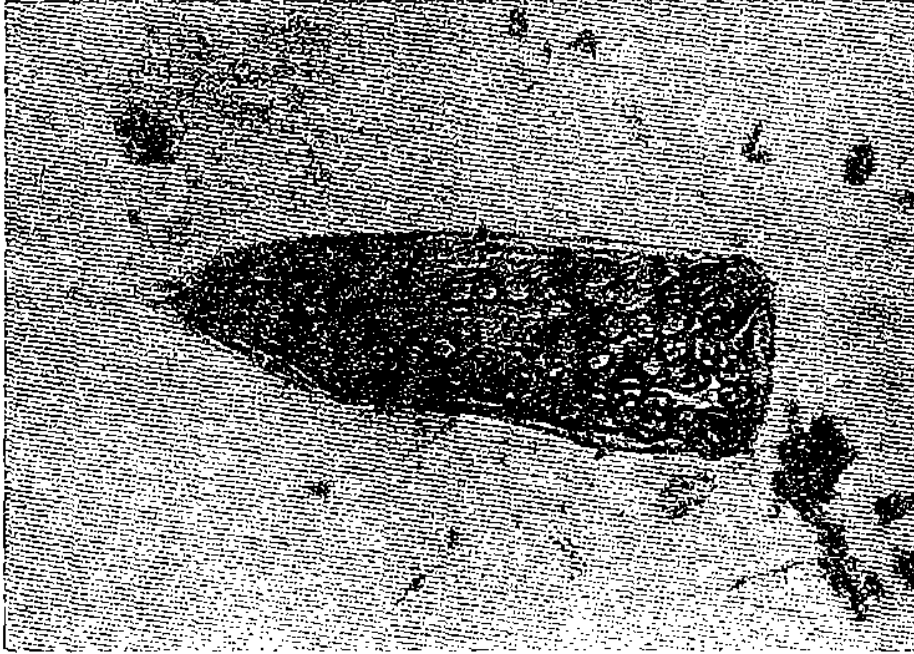


Fig. 11: Parenchyma cells with broad ovals thick-walled pits (400 x)

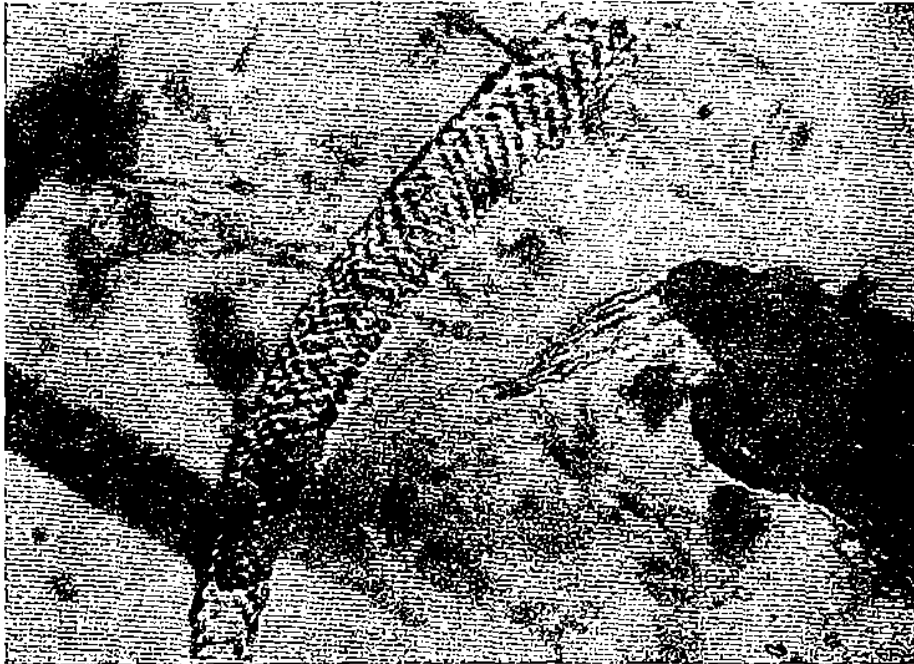


Fig. 10: Spiral vessels (400 x)

Oval and elongated parenchyma cells, oval being 77-155 μ by 44-110 μ , elongated 110-495 μ by 33-55 μ ; large brown thick-walled, lignified rectangular, eletic cells (figs. 7a and 7b), glandular tentacles (fig. 8) containing large multi-cellular stalks traversed by secretory ducts (fig. 5) and spiral vessels, glandular heads bearing 5-7 tracheidal cells, encircled by two layers of glandular cells; xylem vessels, simple pitted (fig. 9) 550-825 μ by 33-44 μ and spirally thickened (fig. 10) large dark-brown parenchyma cells, containing conspicuous, broad, oval thick-walled pits (fig. 11), 165-275 μ by 44-55 μ .

DISCUSSION AND CONCLUSION

Metcalf and Chalk⁷ had reported round cells in mesophyll. The type of stomata was not reported though presence was reported on both sides. In the present studies, elongated, oval cells in mesophyll were recorded. Stomata were identified as actinocytic which were 44-55 μ in diameter. *Drosera rotundifolia* plant must also exhibit large dark brown parenchyma cells containing conspicuous broad, oval, thick-walled pits 165-275 μ by 44-55 μ tracheids with conspicuous reticular thickenings 60-140 μ by 24-34 μ besides other characters mentioned under observation.

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