

BOTANICAL PHARMACOGNOSTIC STUDY OF RHAZYA STRICTA DECAISNE Part II.—Root

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The macroscopic and microscopic characters of the root of *Rhazya stricta* Decaisne are described. The root is characterized by the presence of large amount of starch in the cortical cells and the presence of large amount of included phloem bands in the secondary xylem. Presence of large amount of laticifers and the absence of crystals in the root tissues are the distinguishing characters.

Introduction

The botanical description of the plant and its distribution have already been dealt with in a previous paper.¹ The different uses to which this plant is put and the total alkaloids reported were also mentioned in the same paper.

Material and Methods

The material used in the present study was collected from the adjoining areas of Peshawar, i.e., Jamrud, Khyber Agency. Pieces of the root were fixed in F.A.A. for microtome sectioning just like the stem. After washing out the fixative pieces were softened by Lendrum's technique as given by E. Gurr.² Dehydration and paraffin embedding was done by normal butyl alcohol and ethyl alcohol.³ Staining of the sections was done with safranin and fast green. Jeffrey's method was employed for the maccration of the material as described by Johansen.⁴ Fresh hand sections were cut for the various microchemical tests as given by E. Gurr and Johansen.^{2,4} A few roots were then dried and powdered. The uniform powdered material was obtained by sifting it through a No. 80 sieve and studied after clearing in chloral hydrate. Cell measurements were taken with an eye piece micrometer.

Description of the Root

Macroscopic Characters.—*Rhazya stricta* Decaisne has tap root with secondary rootlets. The older portion of the root is marked with scars of the secondary rootlets. Surface of the root is rough and covered with yellowish brown striated bark with lenticels. Its diameter varies from 2 cm. to 4 cm. in a 2 to 3-year old root. A transversely cut section of the root reveals an outer yellowish brown bark and inner pale yellow wood. Wood occupies about $\frac{1}{3}$ of the entire diameter of the root in the young root, and to $\frac{2}{3}$ in a two to three-year old root. (Fig. 1) The taste is bitter, while the odour is slight.

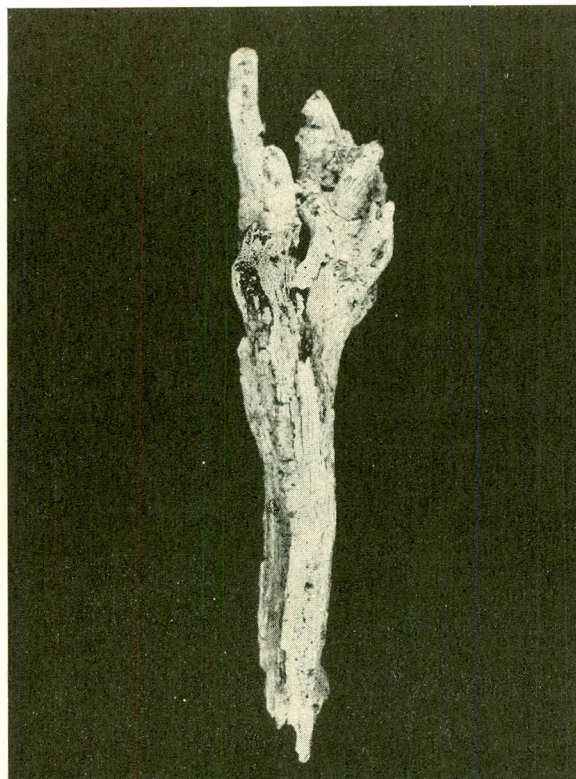
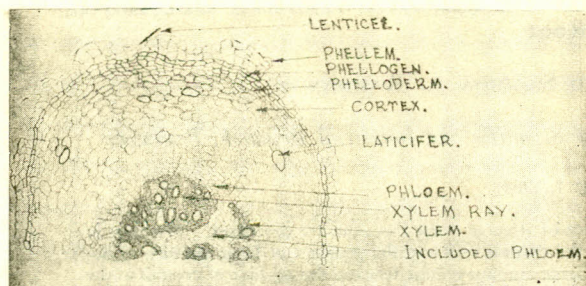
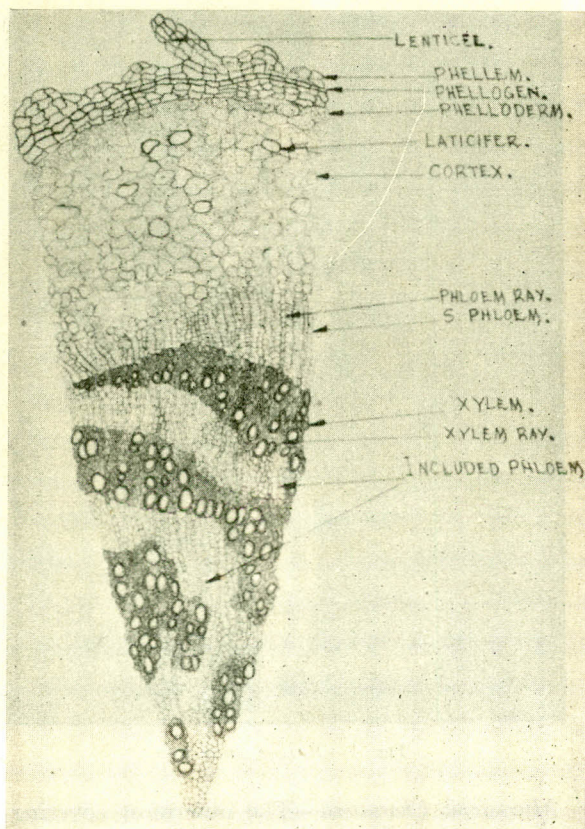


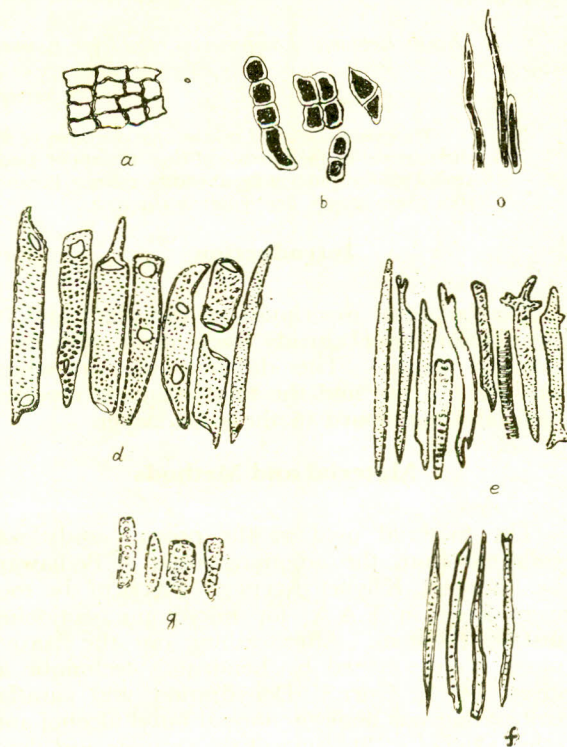
Fig. 1.—*Rhazya stricta* root.

Microscopic Characters.—The outermost covering of the root is yellowish brown periderm which is composed of 8 to 10 layers of cells. The periderm is formed by one layered phellogen, the cells of which are meristematic and rectangular in shape. Phellogen gives rise to phellem on the outside and phelloderm towards the inner side of this phellogen (Figs. 2 and 3). Cork cells measure about $31-61-92\mu$ in length and $20-30-33\mu$ in breadth. Due to formation of lenticels the outer layers of the bark are ruptured. Below the phelloderm is the cortex which is clearly delimited from the cork cells. Cortex in the young root occupies about two-thirds of the entire root, while in the mature

Fig. 2.—T.S. of *Rhazya stricta* root (Young).Fig. 3.—T.S. of *Rhazya stricta* root (Old)

and older roots it occupies about one-third of the entire diameter. The cortical cells are thin walled parenchymatous and measure about $26-33-56\mu$ in length and $19-26-30\mu$ in width. Laticifers are irregularly scattered in the cortex. In transverse section these are abundant near the peripheral region of the root in young as well as mature root. In the macerated root laticifers are also seen in abundance (Fig. 4). These are

non-articulated branched and non-articulated unbranched. Cells of the cortex also contain lot of starch grains.

Fig. 4.—Macerate of *Rhazya stricta* root. (a, cork cells; b, cortical cells; c, Laticifers; d, Fibres; g, Xylem parenchyma).

Beneath the cortex is the phloem region which is in the form of a cylinder. In the older root secondary phloem is formed through the activity of vascular cambium. The phloem is composed of sieve tubes, companion cells, and phloem rays. The phloem rays are indistinct in young root, while in mature roots these are well defined and distinct. A little amount of included phloem (interxylary phloem) is present in a one-year old root while in older root large amount of included phloem is present as in the stem.¹ Included phloem is in the form of irregular patches scattered irregularly throughout the secondary wood and consists of sieve tubes with wide lumina and phloem rays. Internal phloem as seen in the stem is not present in the case of root.

In the young root, as already pointed out, xylem occupies about $1/3$ of the entire diameter of the root (Fig. 2). In old and mature root $2/3$ of diameter of the root is occupied by xylem due to the formation of secondary elements from vascular cambium (Fig. 3). Xylem is composed

of vessels, tracheids, fibres, xylem parenchyma and xylem rays. Vessels are of different shapes. These may be large or small and there is also sometimes a tail towards the end wall perforation. These measure about $173-250-492\mu$ in length and $31-46-92\mu$ in diameter. The vessel pitting is of bordered type. Tracheids also vary in shape and thickenings. Some have pointed blunt or bifurcated ends. Thickenings in tracheids are of spiral, scalariform, and pitted types. These are irregularly scattered and measure about $106-312-539\mu$ in length and $15-20-26\mu$ in width. Fibres with pointed, blunt and bifurcated ends are also seen in the xylem. These are provided with bordered pits and measure about $185-401-600\mu$ in length and $10-17-20\mu$ in width. Xylem also contains xylem parenchyma (Fig. 2). These are provided with relatively large pits and are of different shapes. Xylem rays are usually uniseriate but sometimes biseriata rays are also seen.

Micro-chemical Tests.—Micro-chemical tests for various substances were performed. These tests showed the presence of alkaloids in the entire root. Starch grains were present only in the cortical cells. Proteins were also abundantly indicated. Calcium oxalate gave negative tests.

Powdered Root.—The powdered root is yellowish brown in colour. The taste is bitter, and the odour slight and distinctive. After clearing the powder in chloral hydrate, following structures are seen under microscope (Fig. 5):

- (a) cork cells;
- (b) cortical cells with starch grains;
- (c) broken pieces of laticifers;
- (d) sieve tubes;
- (e) broken vessels;
- (f) broken and complete tracheids;
- (g) broken fibres, and
- (h) xylem parenchyma.

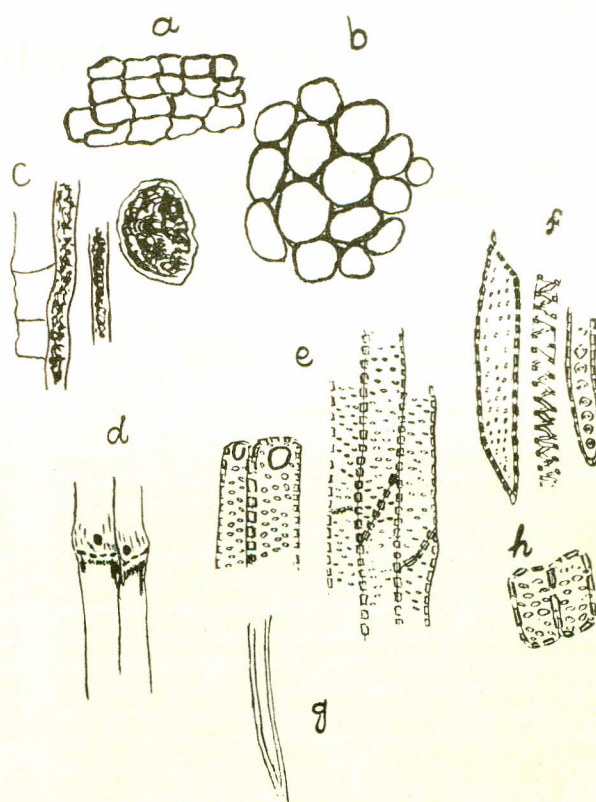


Fig. 5.—Powdered root of *Rhazya stricta*. (a, cork cells; b, cortical cells; c, Laticifers; d, Sieve tubes; e, Vessels; f, Tracheids; g, Fibres; h, Xylem Parenchyma).

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