WRIGHTIA TINCTORIA BARK, AN ADULTERANT OF KURCHI

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The pharmacognostic features of the bark of *Wrightia tinctoria*, an adulterant of Kurchi, have been described and illustrated. Points which differentiate this adulterant from true Kurchi bark, are outlined.

Kurchi bark, *Holarrhena antidysenterica*, is an important antidysenteric drug and is official in the Indian Pharmacopoeia (1955). However, adulteration of this drug is so common that invariably all commercial samples are found adulterated. Prasad and Kaul (1956) have described in detail the pharmacognosy of Kurchi and one of its adulterants, *Wrightia tomentosa*. However, no work on *Wrightia tinctoria*, which is the more common adulterant and which possesses no antidysenteric principle (Chopra 1958), has been reported.

Wrightia tinctoria (family Apocyanaceae) is a small deciduous tree, commonly distributed in Rajasthan, Ceylon, Madras and Burma (Kirtikar and Basu, 1953).

Material and Methods

A fresh sample of the bark was collected from Sohna, district Gurgaon, near Delhi and preserved in 70 per cent ethanol, acetic acid and formaline mixture (90 : 5 : 5). It was authenticated by courtesy of Shri K. C. Sahni of the Forest Research Institute, Dehradun. Usual methods of sectioning and staining were employed.

Macroscopy

The bark (Fig. 1B) occurs in the form of channeled or quilled pieces, 1–2·5 cm. wide, 2–3 cm. long and 1–2 mm. thick. The outer convex surface is light grey in colour showing longitudinal wrinkles and furrows and numerous small whitish circular lenticels. The inner surface is smooth and pale brown in colour. The fracture is tough and brittle. There is no characteristic odour or taste.

Microscopy

The bark shows a distinct cork, a poorly developed cork cambium, a narrow secondary cortex and a wide phloem (Fig. 1A).

The cork (Fig. 1C) is composed of 3–8 layers of suberised cells which are squarish or tangentially elongated. Their tangential walls are thicker than the undulating radial walls. These cells measure T, 34–46–61 μ; R, 20–30–38 μ.

Cork cambium is represented by one or two layers of indistinct cells.

Secondary cortex is roughly divisible into outer 3–5 layers of rectangular cells measuring T, 30–35–44 μ; R, 7–14–20 μ and a few layers of larger irregular polygonal or rounded cells representing the inner cortex. The number of layers constituting the inner cortex vary because of the formation of cork cambium at different levels in the cortex in different bark samples.

Some of the cortex cells contain prism crystals of calcium oxalate which are characteristically rhomboid with their obtuse angles truncated or projecting (Fig. 1C).

The younger bark shows no sclerenchyma in the cortex. In older thicker barks, stone cells may be seen singly or in isolated groups (Fig. 1D). In still thicker pieces of bark, the number and the size of the stone cells constituting each group is considerably increased. Their walls are much thickened and show distinct pores and striated lignification. Prism crystals may be seen occasionally in the lumen of some of the stone cells and more often in the parenchyma cells which immediately surround the stone cell groups. These stone cells measure T, 13–40–51 μ; R, 24–36–41 μ. The innermost layer of secondary cortex merges imperceptibly into the outermost layers of phloem tissue.

The phloem can be roughly divided into an inner, middle and outer phloem. The inner phloem shows uniformly 1–2 cell wide straight medullary rays composed of somewhat radially elongated cells which measure T, 17–28–34 μ, R, 17–37–41 μ. The rays are 10–18 cell high in a tangential section and their number varies from 15–17 per mm. arc. The sieve tube tissue also occurs as straight radial strands 2–4 cell wide. It shows irregular parenchyma in which are scattered sieve tubes with clearly defined transparent sieve plates, companion cells, isolated poorly lignified fibres and latex vessels showing dense granular contents. The fibres in longitudinal section or in macerated preparations (Fig. 1F), show obtuse or blunt ends and a non-uniform thickness due to bulging and constriction of the wall at several places along the entire length. These fibres are also septate and have a length of 14,900–16,500–19,900μ and a breadth of 21–37–51 μ. Some of the fibres show one or more lateral branches. The latex vessels are best seen in a macerated preparation (Fig. 1F) where they appear as long septate tubular structures filled with a dense granular mass. They are 18–24–27 μ in breadth.

The middle portion of the phloem (Fig. 1E) shows a sudden broadening of medullary rays giving a funnel shaped appearance. This causes the adjacent medullary rays and phloem strands to run obliquely. The broadened medullary ray cells also become irregular in outline compared to regular radially elongated cells of the inner portion of the medullary rays. The phloem elements in this region are similar to those described earlier.

The outer phloem presents a highly irregular appearance because the cells constituting the phloem and medullary rays become indistinguishable from each other and also from the cells of the secondary cortex. Some of the medullary rays which had broadened in the mid-phloem again

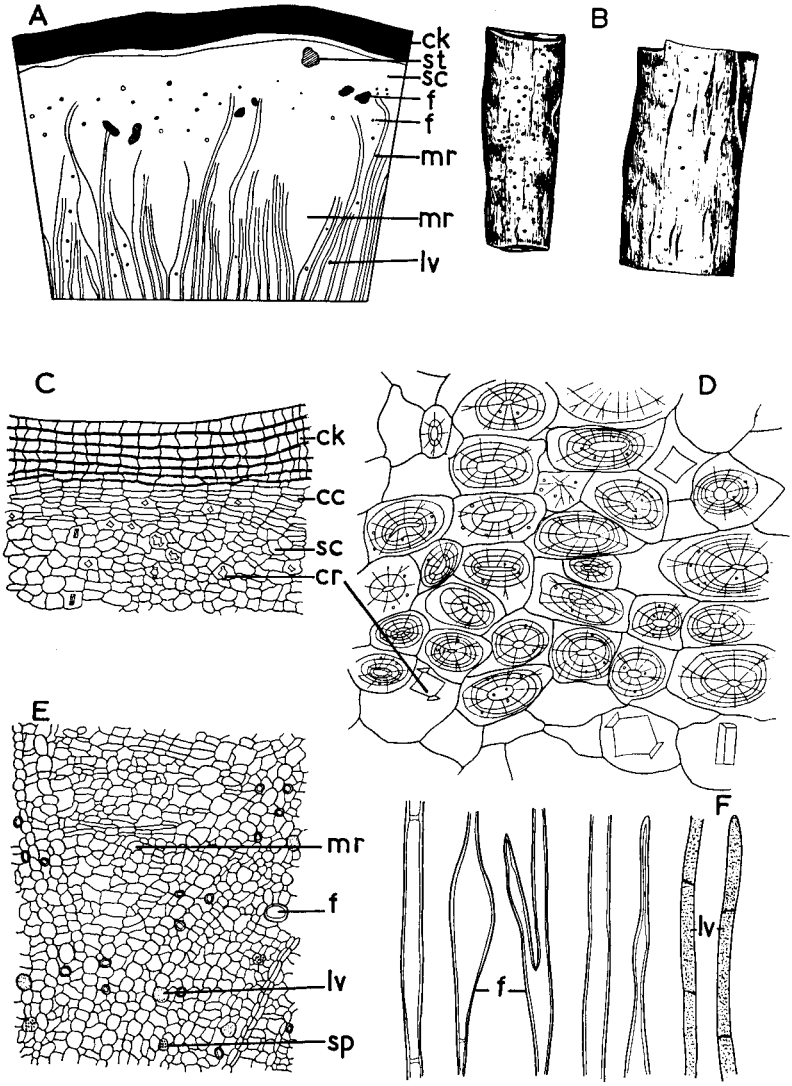

FIG. 1. A, General diagram of transverse section of bark of *Wrightia tinctoria*, × 9, ck, cork; st, stone cell; f, fibre; mr, medullary ray; lv, latex vessel. B, Bark ½ natural size. C, Transverse section showing cork and phelloderm × 28, ck, cork; cc, cork cambium; sc, secondary cortex; cr, crystal. D, Transverse section showing group of stone cells × 216. E, Transverse section showing mid-phloem × 62, mr, medullary ray; f, fibre; lv, latex vessel; sp, sieve plate. F, Macerated preparation showing latex vessels and fibres, f, fibre; lv, latex vessel.

converge, while others continue to broaden as they proceed outward. The rays also terminate at different levels in the outer phloem. Most of the phloem parenchyma in this region contains solitary prism crystals of calcium oxalate similar to those found in secondary cortex. The

TABLE I

FEATURES DISTINGUISHING *Wrightia tinctoria* FROM KURCHI

	Holarrhona antidysenterica	*Wrightia tinctoria*
Macroscopy		
Shape	Transverse or obliquely transverse raspings	Longitudinal channeled pieces
Size		
length	1—1·5 cm.	2—3 cm.
breadth	2—5 cm.	1—2·5 cm.
thickness	2—4 mm.	1—2 mm.
Outer surface colour and lenticels	Buff or reddish brown; prominent, circular or transversely elongated	Light grey small whitish circular
Inner surface	Rough and brown, often pieces of wood attached	Smooth and pale brown
Fracture	Short and granular	Tough and brittle
Taste	Extremely bitter and acrid	Bland
Microscopy		
Stone cells	Arranged in concentric tangential bands, only in phloem region, often show calcium oxalate crystals inside the cell, no striations and pores in the cells	Lesser in number, hardly any crystals inside the cell, only present in cortical region, being absent in the phloem. Distinct pores and striations can be seen in their walls
Pericyclic fibres	Non-lignified and present in early stages, getting peeled off in the mature bark	Absent in both young and mature bark
Phloem fibres	Absent	Present, showing constriction and bulging, varying from 14,900–19,900 μ in length
Phloem parenchyma	Polyhedral to more or less isodiametric	Irregular
Medullary rays	Mostly bi- or tri- seriate, becoming multiseriate up to 6 cell wide; some of the cells of medullary rays become thickened and lignified; 6–7 per mm. arc in the inner region	Mostly uniseriate, a few biseriate and 15–17 per mm. arc in the inner phloem
Calcium oxalate	Present in rosettes and prisms	Present as large prisms of characteristic shape
Latex	Present in cells of non-articulate type, the contents are cream coloured and somewhat transparent	Present in ducts of septate type, mostly in phloem region, the contents are granular and darker in colour
Chemical		
Alkaloid test with Mayer's reagent	Positive	Negative

sieve tubes and sieve plates in this region are not distinct. Latex vessels are scattered throughout this zone. The fibres occur both singly or in a group of 4–8 fibres in contrast to the inner and middle phloem, where they mostly occur singly.

Differentiaton from Kurchi Bark

The description of *W. tinctoria* bark reveals a number of differences from the authentic bark of *H. antidysenterica* (Prasad and Kaul, 1956). These points of distinction are outlined in Table I.

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