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Morphological studies of the Ochnaceae*

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ABSTRACT

The cause of the characteristic sloughing of the bark of certain *Ochna* species is described, while the morphology of the growth buds, leaves and stipules of South African genera of the Ochnaceae is discussed. The taxonomic significance of these features is indicated where relevant.

RESUME

ETUDES MORPHOLOGIQUES SUR LES OCHNACEAE

La cause de la desquamation de l'écorce, caractéristique de certaines espèces du genre Ochna, *est décrite; on discute la morphologie des bourgeons de croissance, des feuilles et des stipules dans les genres sud-africains d'Ochnaceae et, quand il y a lieu, on indique la valeur taxonomique de ces caractères.*

INTRODUCTION

During a recent morphological study of the family Ochnaceae, it was found that relatively little was known of the organography and anatomy of the family. A wealth of taxonomic literature was available, but only a few works gave a synoptic treatment of the anatomy. The aim of this paper is to draw attention to these taxonomically important and interesting characteristics and to stimulate the extrapolation of these finding to other families.

BARK

An interesting characteristic of some of the indigenous species of the Ochnaceae is the rhytidome or outer bark, i.e. all the tissues on the outside of the periderm, that peels off in strips or scales.

According to Esau (1965) this manner of rhytidome formation is common in those species where the phellogen is initiated superficially. While working on the anatomy of the family it was noticed in two species, viz. *Ochna arborea* and *O. pulchra*, that the phellogen was initiated in the epidermis, the epidermal and phellogen cells lying on the same radial lines, but at the same time, it was also initiated quite deep in the cortex. In this instance, the phellogen forms an interrupted undulating band running through the epidermis and cortex right round the stem. In time this undulating band breaks up into outward curving sectors, like shells. These outward curving shells, which overlap and are superimposed over yet others like it, are shed at different times, leaving a smooth, mottled layer of bark (i.e. all the tissues on the outside of the vascular cambium). In these two species it was found that the phellogen gives rise to a very thin layer of phellem, coinciding with the smoothness of the bark when the outer layers slough off (Fig. 1). In all the other indigenous species of the Ochnaceae, the phellogen is initiated relatively deep in the cortex with, in addition, a thick layer of phellem. The outer layers slough away gradually and the bark, exposed after sloughing, is rough and evenly coloured (Fig. 2). Making use of this character the species can be separated into two groups, the one group coinciding exactly with the section Renicarpus to which *O. arborea* and *O. pulchra* belong.

BUDS AND GROWTH PATTERN

Two interesting features regarding the growth pattern of the Ochnaceae were observed that have hitherto escaped notice. The first is the two different kinds of buds encountered, and the second, the growth pattern. The first type of bud found in the family is responsible for the annual growth increment. The growth buds are laterally compressed and taper to a sharp point (Fig. 3). The second type of bud is the flower bud of which two kinds are found. Species where the flowers are borne singly have easily recognizable pear-shaped and globose buds (Fig. 4). Where the flowers are borne in clusters or cymes the buds are produced in a club-shaped structure, similar to the growth buds (Fig. 5).

FIG. 1.—The smooth, peeling bark of *Ochna pulchra*.

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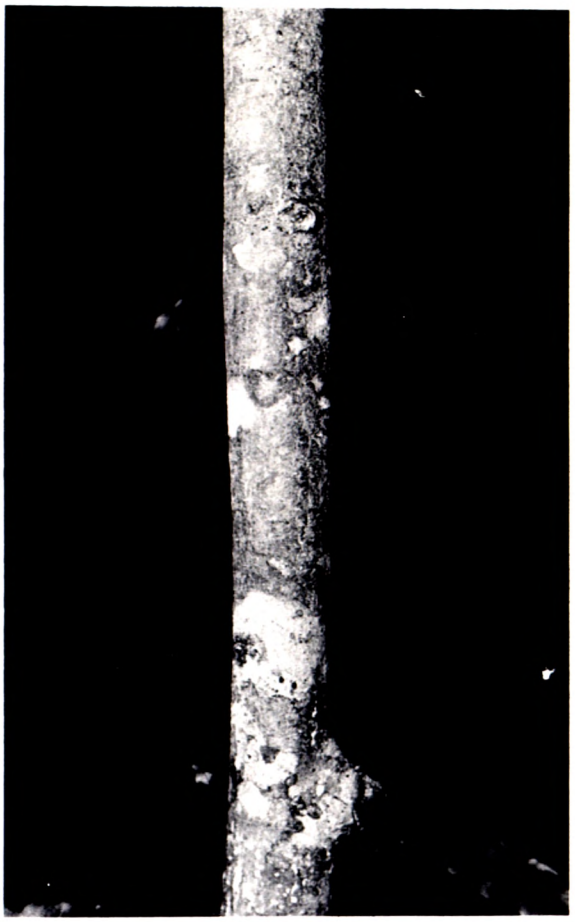

FIG. 2.—The rough, non-peeling bark of *Ochna holstii*.

FIG. 3.—The laterally compressed growth bud of *Ochna pulchra*.

FIG. 4.—The single flower buds of *Ochna serrulata*.

FIG. 5.—The club-shaped compound flower bud of *Ochna pulchra*.

FIG. 6.—The cyme of *Ochna pulchra*; note the two rows of boat-shaped scales.

Both the growth buds and the compound flower buds are protected by a series of scales. The scales are arranged in alternating series. One large serrated or entire scale, covering the axillary bud. On the opposite side of the stem, the space between the two margins of the large scale is covered by a lanceolate or subuliform scale, which seems to be homologous to the two stipules of the foliage leaves.

At the end of the growing season, the flower and leaf buds are already fully developed and open (unfold) with the first spring rains of the following season. In both the growth and flowering buds, a typical feature of the Ochnaceae is displayed, viz. the growthflush, which takes place in early spring when the temperature rises and just after the first spring rains. During the growthflush the scales break away in two or three series and the stem and peduncle elongates (Fig. 6). The scales mostly break away in two series due to their pseudo-distichous arrangement. The angle of divergence is approximately 150°, but due to the stem being twisted, the leaves and scales take on the appearance of being distichous. The spirally arranged nature of the leaves can be seen when the young leaves unfold. During the growthflush, which lasts for approximately a week, the annual growth increment of the plant is completed and the axillary buds of most species are quiescent for the rest of the growing season. The annual growth increment can be recognized by the amount of new growth between the series of scale scars at the tip of the previous season's stems and the growth bud. The quiescent axillary buds in the series of scale scars give rise to the flower buds and/or sideshoots of the following season. In some species stems may also be terminated by flowers.

LEAVES AND STIPULES

The family Ochnaceae in Southern Africa is represented by two genera, viz. *Ochna* and *Brackenridgea*. In distinguishing between these two major taxa, the morphology of the leaves and stipules was found to be taxonomically useful. According to

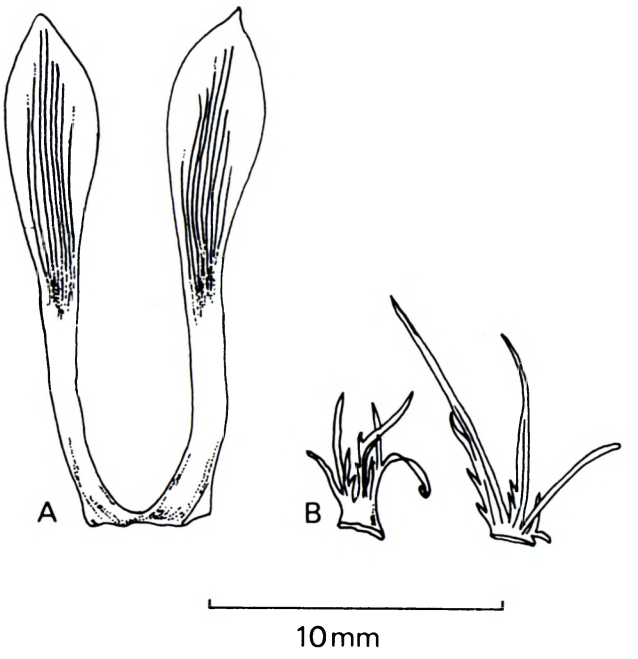

FIG. 7.—Diagram to illustrate the stipules of A, *Ochna* and B, *Brackenridgea*.

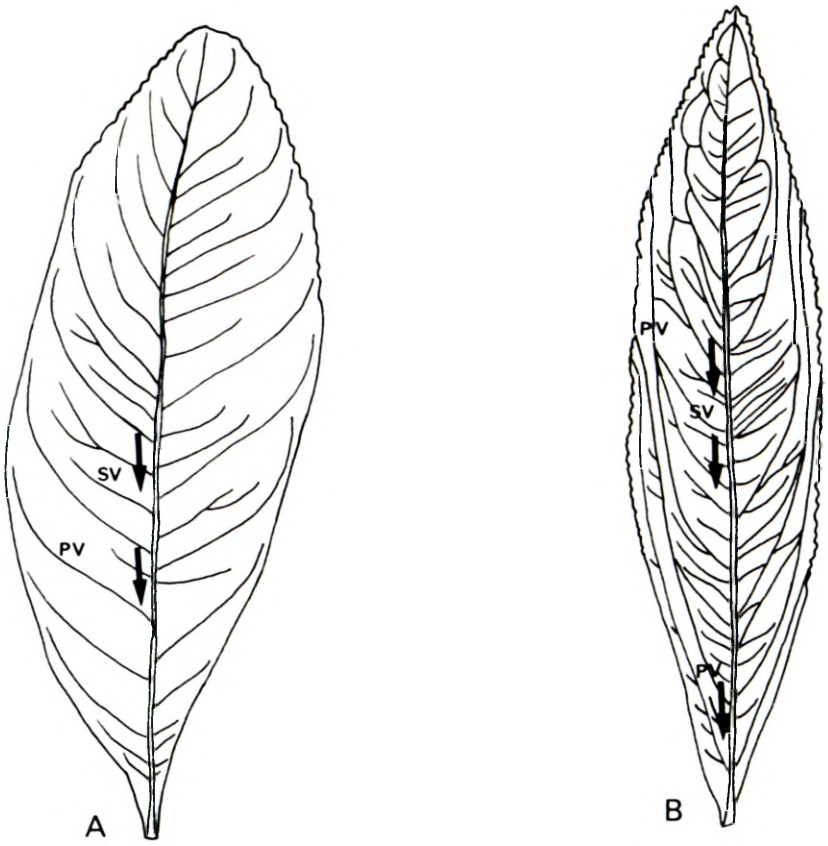

FIG. 8.—Diagram to illustrate the types of veins in A, *Ochna* and B, *Brackenridgea*. PV—Primary-vein; SV—Secondary-vein. Arrows point to the angle of emergence of the different veins.

Sinnott and Bailey (1914), there is a relationship between the occurrence of stipules and the dentations on the leaf margins. In the indigenous species of the Ochnaceae, the leaf margin is excurrent onto the adaxial side of the petiole and joined to the stipules. In these instances the stipules can then be regarded as the most basally situated teeth of the leaf margin.

In all the species of *Ochna* the stipules are caducous, especially in *Ochna pulchra*, in which the stipules are shed just after the growthflush and the teeth of the leaf margin are deciduous with age. The stipules are lanceolate to spathulate, undivided and entire (Fig. 7A). The stipules of *Brackenridgea* remain on the plant for the whole growing season, and are divided into a number of linear lobes, which may be entire or dentate (Fig. 7B).

The venation is a useful taxonomic character and the veins can be divided into primary and secondary veins (Fig. 8). The primary veins are conspicuously prominent on the adaxial surface, with the secondary veins less so. In the case of most of the *Ochna* species both the primary and secondary veins arise from the midrib at an angle of 60°–70°. The veins run parallel to one another with the secondary veins gradually lessening in diameter until they disappear. The primary veins run to the leaf margin, turning distally with their diameter gradually lessening (Fig. 8A). In the case of *Brackenridgea arenaria* and *O. confusa*, the primary veins arise from the midrib, at an angle of 30°–40°, with the primary veins anastomosing near the distal end of the leaf. The secondary veins arise from the midrib at an angle of 60°–70° and run parallel to one another, gradually lessening in diameter until they end at the primary veins (Fig. 8B).

UITTREKSEL

Die oorsaak van die kenmerkende wyse waarop die bas van sommige Ochna*soorte afdop, asook die morfologie van die groeiknoppe, loofblare en steunblare word bespreek. Die taksonomiese toepaslikheid van die eienskappe word aangedui waar ter sake.*

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