

XYRIDACEAE

ANATOMICAL OBSERVATIONS ON THE PEDUNCLE OF *XYRIS CAPENSIS*

Xyris capensis Thunb. is a widespread, common pioneer species in southern and tropical Africa. It colonizes moist open situations, either permanent marshes or seasonal seepage areas as found beside newly scraped road verges. Much viable seed is produced and even paedogenic specimens, only 20–30 mm tall, produce 1–2-flowered capitula. *X. capensis* can be distinguished from related species by its distichous leaves with bluntly apiculate apexes and

the peduncle which is green above and becomes golden brown below, besides floral characters.

The upper two-thirds of the mature peduncle of *X. capensis* is green in contrast to the basal portion which is orange-brown and shiny. In the transitional region, between these two distinct zones, raised ribs of green tissue alternate with brown, flat-bottomed furrows. These tongues of green tissue become increasingly narrower in a basipetal direction until they

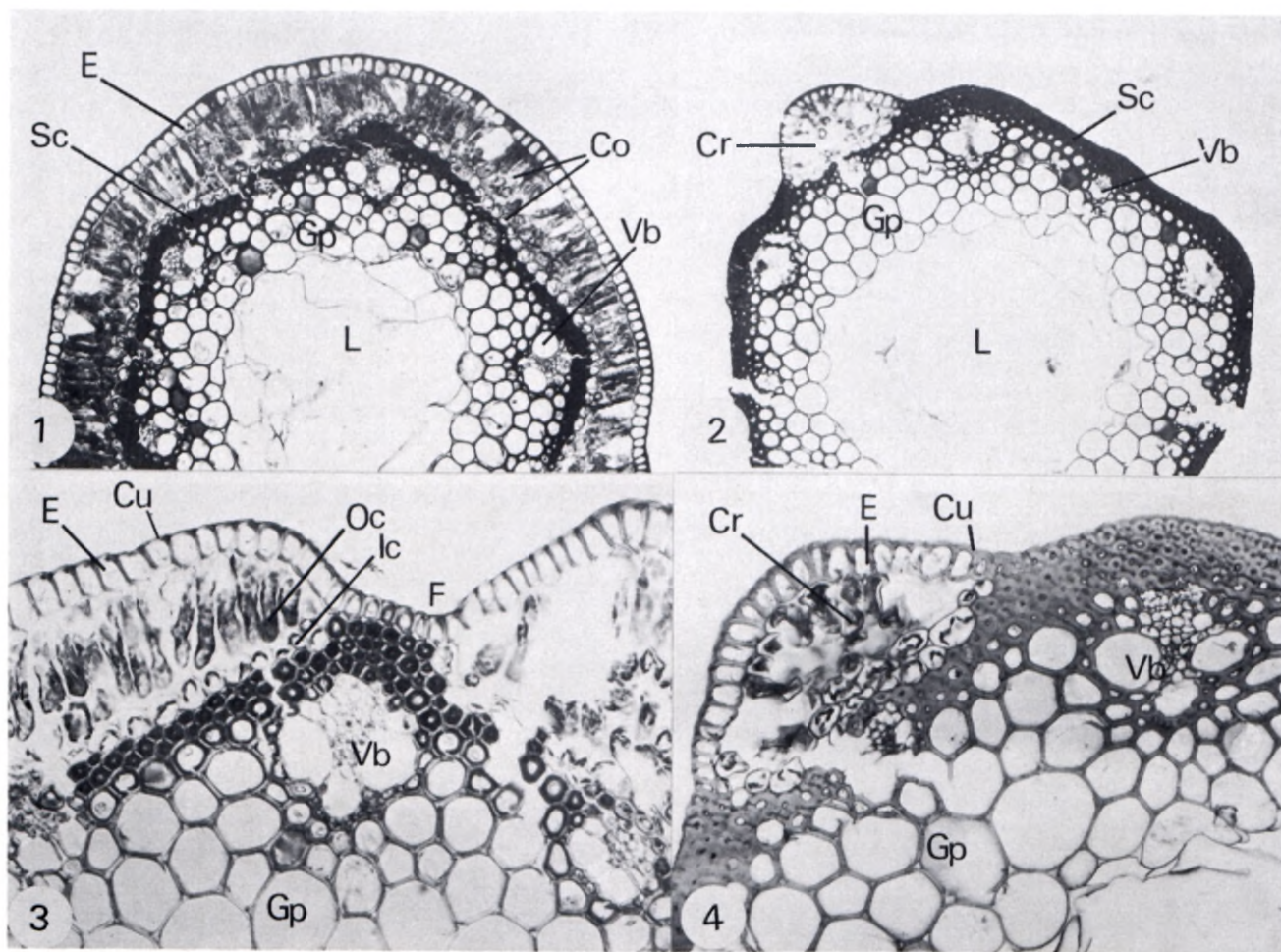


FIG. 7.—Transverse sections of the peduncle of *Xyris capensis*. 1, upper green part of peduncle with chlorenchymatous cortex; $\times 70$ bright field; 2, lower orange-brown part of peduncle largely lacking cortical layers. $\times 70$ bright field; 3, narrow furrow in predominantly chlorenchymatous cortex with discontinuous inner cortical layer but continuous epidermis. $\times 180$ interference contrast; 4, narrow rib in zone where cortex is practically absent. Note development of both cortical layers and of an epidermis in even this small rib. Cuticle continuous over sclerotic cylinder. $\times 180$ bright field. Co—cortex; Cr—cortical rib; Cu—cuticle; E—epidermis; F—furrow; Gp—ground parenchyma; Ic—inner cortical layer; L—lacuna; Oc—outer cortical layer; Sc—sclerotic cylinder; Vb—vascular bundle.

eventually peter out completely. In younger peduncles the entire inflorescence axis is green. However, with subsequent extension growth from the base, no chlorenchymatous tissue appears to be differentiated in the newly-formed basal parts of the more mature scape.

To determine the anatomical reasons for these morphological differences, transverse sections were made of the transitional zone of mature peduncles of *X. capensis* plants collected at Tierpoort near Pretoria. These sections revealed that the observed difference was not merely due to an absence of chloroplasts in the lower parts of the peduncle, but that the upper and lower parts of the inflorescence axis differ markedly in anatomical structure.

The upper, green parts of the peduncle have a narrow, 2-layered chlorenchymatous cortex completely surrounding the central cylinder and lacking vascular bundles (Fig. 6.1). The outer cortical cells are somewhat palisade-like and resemble the mesophyll of the lamina and comprise a single layer of uniform vertically elongated cells, radially arranged and immediately adjacent to the epidermis. The epidermis itself is also very uniform consisting of vertically elongated to iso-diametric cells as seen in transverse section with anticlinal and exterior walls somewhat

thickened (Fig. 6.3) and possessing a continuous cuticle. The inner cortical layer consists of compact, rounded unthickened cells with fewer cell contents than the outer cortical layer. This layer resembles an endodermis in transverse section.

The central cylinder is delimited by a conspicuous sclerotic cylinder of very thick-walled cells with narrow lumens. This cylinder grades into the larger, thin-walled ground parenchyma. This sclerotic cylinder lies immediately exterior to a regular system of more or less alternate large and small vascular bundles. The centre of the axis is hollow due to breakdown of the central ground parenchyma cells.

The sections taken from the orange-brown, basal parts of the peduncle (Fig. 6.2) differ considerably from the above (Fig. 6.1). The two cortical layers and epidermis are lacking in this zone except over the ribs where present (Fig. 6.2). The cuticle is continuous over the outer layer of sclerenchyma of the central cylinder (Fig. 6.4). The central cylinder itself resembles very closely that of the upper green parts of the peduncle.

In the transitional region narrow furrows lacking chlorophyll penetrate upwards into the cortex (Fig. 6.3) and conversely narrow tongues of chloren-

chymatous cortical tissue penetrate downwards over the central cylinder (Fig. 6.4). In other words, the ribs of cortical tissue become progressively wider in an upwards direction until the furrows are eliminated completely or vice versa. It will be seen (Fig. 6.4) that even in the smallest ribs chlorenchyma and an epidermis are developed, but that in the narrowest upper parts of the furrows (Fig. 6.3) a continuous epidermis still exists.

It certainly was surprising to find such gross anatomical differences associated with what originally appeared to be merely a colour change on the peduncles of *X. capensis*. It will be interesting to see whether complex anatomical differences are also associated with similar colour changes in the culms of other monocotyledons.

R. P. ELLIS, R. MANDERS & A. A. OBERMEYER