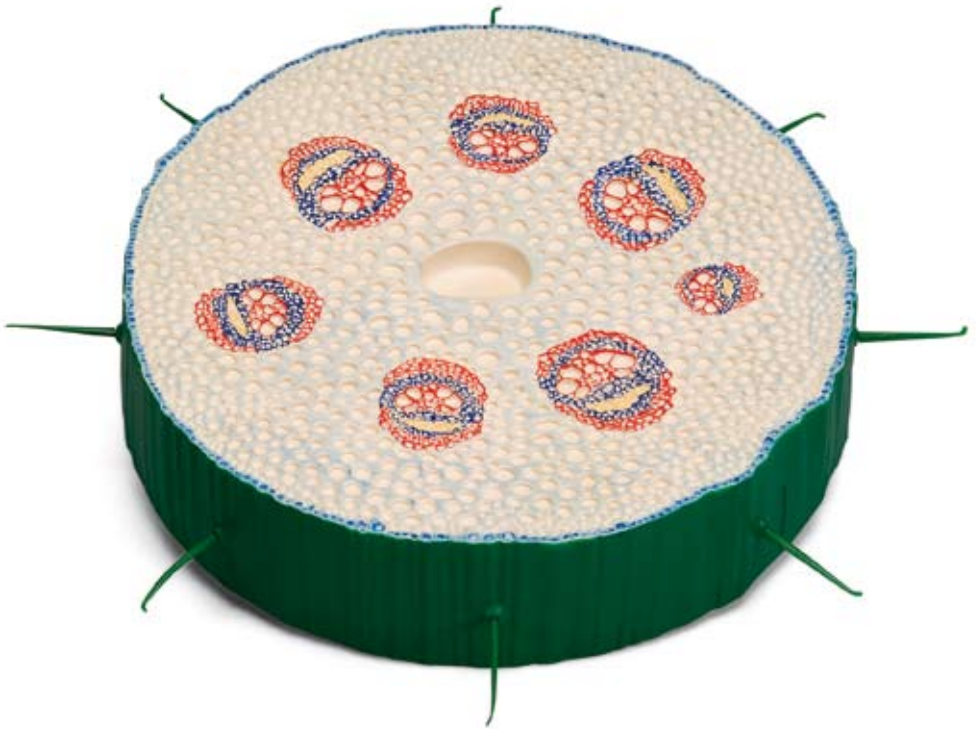




...going one step further



T21003

Ranunculus repens – Creeping buttercup; Buttercup or Crowfoot family - Ranunculaceae
Cross-section of stem with collateral open vascular bundles

The creeping buttercup is a tenacious herbaceous plant classified as a dicotyledon (two embryonic leaves), within the buttercup or crowfoot family (Ranunculaceae), which is predominantly found in the moderate zones of Northern hemisphere, with about 1800 species in 50 genera.

The fast-growing winter-green semirosette plant is a pioneer in gardens, fields, ruderal land, as well as waterfronts, meadows and forests on loamy, deep soil. Vegetative reproduction is by means of above-ground stolons, similar to the strawberry, at the ends of which roots are first formed deep in the ground, followed by the development of new young plants. The general shape of the leaves is indicated by the trivial name 'crowfoot' family. Differently shaped nectar and honey leaves near the flowers are characteristic. Young plants germinate relatively quickly from small nut fruit. The cross-section of the non-lignified herbaceous stem shows a typical dicot plant structure.

A circular arrangement of several open collateral vascular bundles is embedded in a thin-walled cortical parenchyma, which is still capable of photosynthetic activity in the outer area due to the presence of chloroplasts underneath a hairy epidermis, while however adopting a storage function towards the inside. The external and internal caps as well as a generally only unicellular ring are made of sclerenchymatous cells (red) with slightly thickened cell walls, in which the woody material lignin is embedded. These form the vascular bundle sheath, interrupted by individual thin-walled conducting cells. Towards the inside, the sclerenchyma (red) is followed by the phloem (blue) - the part of the vascular bundle, responsible for transport of nutrients in the plant, composed of larger sieve tube elements and their small companion cells, each originating from the unequal division of one mother cell. The phloem cells are accompanied by phloem parenchyma cells (blue). Going towards the inside, the next water-conducting part of the vascular bundle, the xylem (red), is also embedded in associated parenchyma (blue).

This is separated from the phloem by the fascicular cambium (yellow), a meristematic tissue dividing phloem elements towards the outside and xylem elements towards the inside. This is why the first xylem elements (protoxylem) are also located right inside. The presence of the cambium, through which the vascular bundle can continue to develop to a certain limit, makes the vascular bundle open. 'Collateral' means that the phloem and xylem are located opposite to each other, with the xylem always located inside. A pith cavity is noticeable in the centre of the cross-section. This was created by primary radial growth pulling apart the cells of the cortical parenchyma and causing the tissue to tear or break up.

- 1 Epidermis
- 2 Assimilation tissue
- 3 Cortical parenchyma
- 4 Pith cavity
- 5 Sclerenchymatous vascular bundle sheath
- 6 Hair
- 7 Xylem
- 8 Phloem
- 9 Cambium
- 10 Companion cell, small, blue
- 11 Conducting strip
- 12 Protoxylem
- 13 Sieve tube element
- 14 Vessels
- 15 Xylem parenchyma
- 16 Phloem parenchyma
- 17 Pith parenchyma
- 18 Sieve tube element with companion cell

