VI. ONTOGENY OF TENDRILS IN 
ANTIGONON LEPTOPUS H. & ARN.

A lovely and beautiful climber, Antigonon leptopus is cultivated in the gardens. It is commonly known as Coral-creeper or Pink-vine. It is an extensive climber climbing by means of axillary tendrils (Figs. 1 - 4). The main axillary branch is tendrillar. At its lower nodes, small bract like leafy structures are present. In the flowering season, flowers are present in their axils. Near its distal region, 2 - 3 hook like tendrillar structures are present which also bear flowers in their axils (Fig. 1). The apex of the main axillary branch terminates into two or three tendrillar appendages (Figs. 1 - 3).

According to Bailey (1960) the raceme terminates in a tendril. Backer (1963) also considers that the rachis of the raceme frequently terminates in a branched tendril.

SHOOT APEX: The shoot apex is dome shaped. A single layer of tunica and an inner mass of corpus are present. There is no distinct cytohistological zonation. The rib meristem is present. The degree of stratification of the corpus varies in relation to the plastochronic phase. The initiation of the leaf is due to periclinal divisions in the second and third layers in the flank of the corpus (Fig. 5).
ONTOGENY OF THE TENDRILS: The earliest axillary bud or tendril meristem is visible at the second node. It arises from the peripheral meristem of the apex (Figs. 6, 7). The bud meristem appears as a nest of vertically elongated cells arranged in rows. It is eumeristematic. The bud meristem is four layers deep. Initially it is lateral in position but in the lower nodes it occupies an axillary position. The arcuate band of cells is differentiated adaxial to the bud (Fig. 7). It extends up to the base of the bud. Its origin is partly from the bud meristem and the adjacent ground meristem (Figs. 7, 8B).

Figures 9 and 10 illustrate the further development of the axillary bud. The bud protrudes out due to anticlinal and periclinal divisions in the corpus cells. The young bud appears convex and eumeristematic. The stratification is confined to 3 - 4 layers. Centrally situated corpus cells appear vacuolated and are differentiating into rib meristem zone. At this stage, a group of cells lying very close to the leaf i.e. at an angle formed by the leaf and bud appear lightly stained (Fig. 10). This is the earliest visible differentiation of the accessory bud meristem.

Further stages of the young tendril primordium (i.e. the main developing axillary bud) are illustrated in
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**Fig. 1.** An axillary tendril showing bract tendrils and flowers, X 1.

**Fig. 2.** Young axillary tendril, X 1.

**Fig. 3.** An old axillary tendril, X 1.

**Fig. 4.** A branch showing young axillary tendrils, X 1.

**Fig. 5.** L.s. shoot apex, X 1250; inset, X 310.

**Fig. 6.** L.s. shoot apex, X 1250.

**Fig. 7.** L.s. shoot apex with bud meristems (BN) at the 2nd and 3rd nodes, X 1250; inset, X 310.

**Figs. 8A and 8B.** L.s. shoot apex with the bud meristem at the 3rd node, Fig. 8A, X 310; Fig. 8B, X 1250.

A = axis; AC = accessory bud; AX = axillary bud; BN = bud meristem; BR = bract; BT = bract-tendril; FL = flower; L = leaf; L₁ = first leaf; L₂ = second leaf; L₃ = third leaf; FA = arcuate zone; SA = shoot apex; T = tendril; TT = terminal tendrils.
The primordium elongates due to the activity of the rib meristem. It increases in radial diameter due to periclinal divisions in the second and third layers of the primordium, subjacent to the protoderm. The apical meristem of the primordium does not show any cytohistological zonation at this stage also. The frequency of periclinal divisions is more than that observed in the main shoot apex.

As already stated above the axillary tendril usually bears 6 - 7 lateral bracts. 2-3 distally situated bract primordia modify into tendrils (Figs. 2 and 3). The initiation of the leafy bract is due to periclinal divisions in the second and third layers of the tendril primordium (Fig. 12). The bract primordia first arise near the base of the tendril. At this stage the parenchymatization occurs in the cells of the basal region of the tendril. The accumulation of phenolic contents occurs during the maturation of epidermal cells. But the tip region of the tendril is eumeristematic at this stage. The accessory bud at this stage has slightly protruded. It is four layers deep. The periclinal divisions in the second layer of the accessory bud also contribute to the growth of the bud tissue (Fig. 13B). The cells of the tunica and the subjacent layers are sometimes prominently elongated (Fig. 13B).
Figures 14 and 15 show further stages in the development of the axillary tendril primordium. The primordium elongates rapidly due to marked elongation of pith cells and rapid activity of the rib meristem below the eumeristic-matic apex. The tip portion is moristic-matic showing frequent periclinal divisions. Some of the centrally situated derivatives rapidly differentiate into pith cells. The ground meristem cells also appear elongated. The protoderm cells frequently divide anticlinally. The bract primordia are successively initiated in an acropetal manner (Fig. 15). The initiation of all the bracts is similar.

As stated above the bracts situated near the terminal region of the tendril are modified into small tendrillar appendages. In the developing stages they are termed here as bract-tendril primordia. Figure 16 illustrates the inception of a bract-tendril primordium. The apical meristem of the axillary tendril appears slightly elevated at this stage. The eumeristic region is confined to three layers below which the pith cells are rapidly differentiated. The histological stages of the inception of the bract-tendril are similar to those of the leaf-like bract. But the later developmental stages of this primordium considerably differ from those of the bracts, situated at lower nodes (Figs. 17A, 17B, 18A, 18B). The bract primordium
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**Figs. 9 - 11.**
L.s. developmental stages of axillary bud (Note AC in Fig. 10), X 1250; Fig. 9 inset, X 124; Fig. 10 inset, X 340.

**Fig. 12.**
L.s. developing axillary tendril with accessory bud, X 1250.

**Figs. 13A and 13B.**
L.s. accessory bud. Fig. 13A, X 124; Fig. 13B, X 1250.

**Figs. 14 and 15.**
L.s. developmental stages of the axillary tendril with bract primordia (BR), X 1250; Fig. 15 inset, X 124.

**Fig. 16.**
L.s. axillary tendril with bract tendril primordia (BT), X 1250; inset, X 310.

A - axis; AC - accessory bud; AD - adaxial side; AX - axillary bud; BR - bract; BT - bract tendril; L - leaf; M - meristem region; V - vacuolated cells.

Darkened cells show the presence of phenolic contents.
develops as a dorsiventral structure and abaxial and adaxial parenchymatization marks the process of its early development. The differentiation of apical and subapical initials and the marginal meristem are also distinct aspects of the bract development (Figs. 17A, 17B). Sometimes a bract-tendril also shows limited marginal meristem activity (Fig. 19). Figures 20A and 20B illustrate the early developmental stages of the bract-tendril. The young primordium assumes a cylindrical shape due to the distinct pattern of growth characteristic of a tendril.

Figures 21-23 illustrate the developmental stages of the bract-tendril at the terminal region of the axillary tendril. Usually two or three primordia of bract-tendrils arise at the terminal region. The developmental stages indicate that they arise as lateral primordia from the apex. Later they are modified into tendrils. After the origin of these primordia the residuum of the apical meristem of the axillary tendril persists for some time. It appears flat and 3-4 cells deep. Sometimes periclinal divisions occur in these layers. Ultimately these cells are also parenchymatized (Figs. 22 and 24).

The young tendril primordium is cylindrical. The protodermal cells are full of phenolic contents (Fig. 25).
Occasionally its tip region appears pointed. The procambium more or less extends up to the tip region. The cells of the pith and cortex are elongated. The tangential divisions occurring in the cells subjacent to the epidermis result into the radial increase of the tendril (Fig. 26B). The cells with phenolic contents are scattered in the cortex and the pith.

In the flowering period the floral buds arise in the axils of the bracts and bract-tendrils. No flower buds are observed in the axils of the terminal bract-tendrils. The floral bud meristem is differentiated from the adaxial basal cells of the bract (Fig. 27B). In its further growth readjustment the position of the floral bud becomes axillary (Fig. 28).

Figure 29 illustrates the vascular relationship between the bract-tendril and the axillary branch. There is a single trace for the bract-tendril.
PLATE LXX

Figs. 17A - 19
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Figs. 17A and 17B. T.s. axillary tendril with its bracts (BR) and bract tendrils (BT). Fig. 17A, X 124; Fig. 17B, X 1250.

Figs. 18A and 18B. L.s. axillary tendril with its bracts and bract-tendril. Fig. 18A, X 310; Fig. 18B, X 1250.

Fig. 19. T.s. bract-tendril primordium showing reduced meristematic activity at the margins (a & b), X 1250.

A = axis; AX = axillary bud; BR = bract; BT = bract-tendril; FL = floral bud; L = leaf; M = meristematic region; PC = procambial strand; RM = residual meristem.
PLATE LXXI

Figs. 20A - 25
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Fig. 20A. L.s. axillary tendril, X 310.

Fig. 20B. An enlarged portion from Fig. 20A showing lateral bract-tendrils and initiation of terminal bract-tendrils, X 1250.

Figs. 21-23. L.s. developmental stages of terminal bract tendrils (Note residuum of apical meristem (M) in Fig. 22). Fig. 21, X 124; Fig. 22, X 1250; inset, X 124; Fig. 23, X 72.

Fig. 24. L.s. residuum of the apical meristem of an axillary tendril, X 1250.

Fig. 25. A tendril tip enlarged from Fig. 27A, X 1250.

A - axis; AC - accessory bud; BR - bract; BT - bract-tendril; FL - floral bud; L - leaf; M - meristematic region; PC - procambium; PR - prophyll; TA - tendril tip; TI - initiation of terminal bract-tendrils; TT - terminal tendrils.

Darkened cells show the presence of phenolic contents.
PLATE LXXII
Figs. 26A - 29
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Figs. 26A and 26B. L.s. tendril tip, Fig. 26A, X 124; Fig. 26B, X 1250.

Fig. 27A. L.s. young axillary tendril with floral buds, X 124.

Fig. 27B. A basal portion of the bract-tendril (BT) enlarged from Fig. 27A showing the initiation of a floral bud meristem (FL) in its axil, X 1250.

Fig. 28A. L.s. young axillary tendril with floral buds, X 124.

Fig. 28B. Developmental stage of a floral bud (FL) enlarged from Fig. 28A, X 1250.

Fig. 29. T.s. axillary tendril with bract-tendril (BT) , X 1250.

AB = abaxial side; AD = adaxial side; BR = bract; BT = bract-tendril; FL = floral meristem; L = leaf; PC = procambium; TA = tendril tip; TT = terminal bract-tendrils; V = vacuolated cells.