日本産ツツジ属植物雑報 (17): 果皮における厚膜組織の発達

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Masahide KURITA*: Some Notes on the Rhododendron Plants from Japan XVII. A Development of Sclerenchyma in a Pericarp.

栗田正秀*：日本産ツツジ属植物雑報
(17) 果皮における厚膜組織の発達

According to HAMA (1958), a capsule in a limited sense is a fruit which is derived from a syncarpous ovary and dehisces longitudinally. Dehiscence of dry fruit in general is based on an arrangement of sclerenchyma and parenchyma in the pericarp.

The present study was carried out on the development of sclerenchyma through a maturation of an ovary into a fruit in *Rhododendron* plants. The sclerenchyma was discussed from the two following points of view: 1) an increase in size of capsule and 2) a dehiscence of capsule.

Materials and Methods

The material plants used were *Rhododendron indicum* (L.) SWEET and *Rh. dilatatum* MIQ. var. *decandrum* MAKINO. The former was cultivated in Yokkaichi city and the latter grew wild at Eno, Komono cho, Mie gun.

An observation on a sclerenchyma was carried out especially on a basal area of the septum between two adjoining locules, and on an area under a main vascular bundle of a carpel and a pericarp. The former area is denoted by area-a (Fig. 1, a) and the latter by area-c (Fig. 1, c). For making a description short and clear, the four innermost cell layers in a carpel and a pericarp (excluding a part projected into a locule), beginning with an adaxial epidermis, are called layer-I, -II, -III and -IV. The other layers are disregarded because they very probably do not have a close relation to the development of sclerenchyma.

Observation

No distinct difference was found in the features of sclerenchyma between the two species. As an ovary matures into a fruit, the sclerenchyma occurs on the adaxial side (Fig. 1, dotted area) of the whole carpel except for a part projecting into a locule.

1. Ovary

In area-**a**, the cells of layer-I have no chlorophyll grain, while those of layer-II have a few grains (Fig. 2). These two layers differ from the other layers which have many grains in each cell. In a cross section of ovary, the cells of layer -I and -II are nearly square, a side being about 9 μm in length. In area-**c**, the cells of layer-I are fairly elongated in a tangential direction to the locule and are of a spindle shape. Each cell is about 50 μm to 90 μm in length and has no chlorophyll grain (Fig. 3). In a rare case, layer-I in area-**c** is found to be composed of two rows of cells at its small locality. The cells of the other layers (II-IV) are similar to those of layer-II to -IV found in area-**a**.

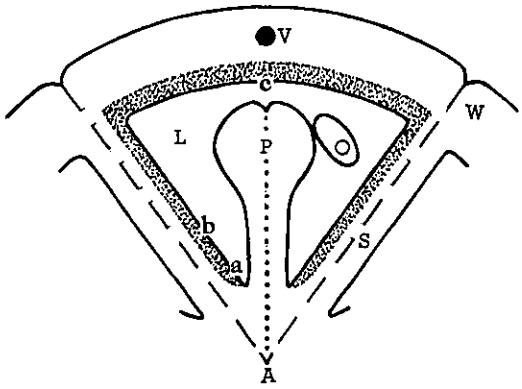

Fig. 1. Diagramatic illustration of a single carpel in cross section. A, Central column of ovary. W, Ovary wall. L, Locule. P, Placenta. O, Ovule. S, Septum. V, Median vascular bundle. Interruped Line, Suture of contiguous carpels. Dotted line, Suture of both marginal parts of a single carpel. Dotted zone, Area where a sclerization will take place. a, b and c, Area studied especially.

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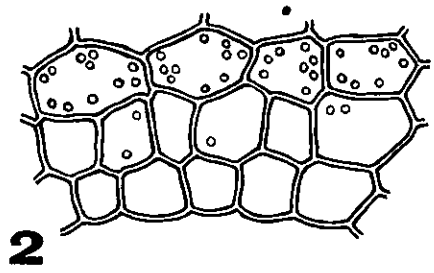
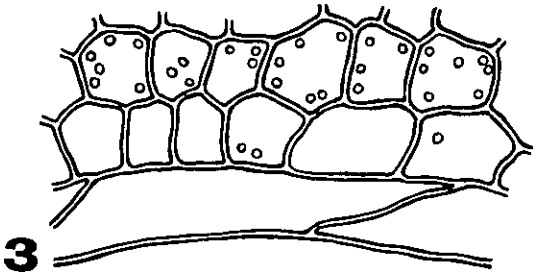
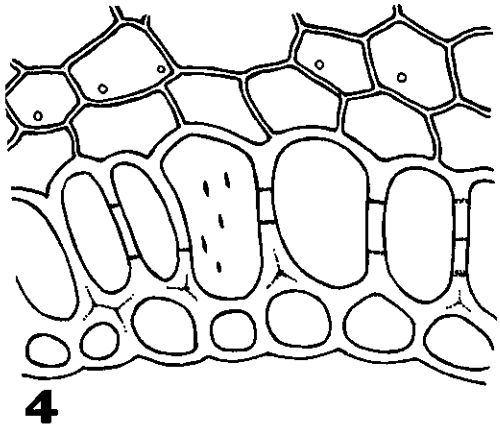
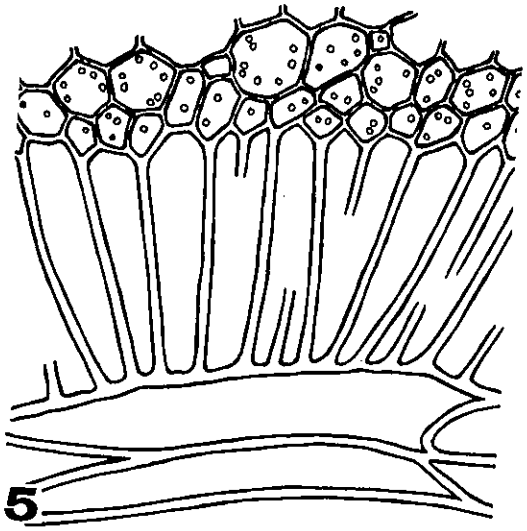
2. Capsule

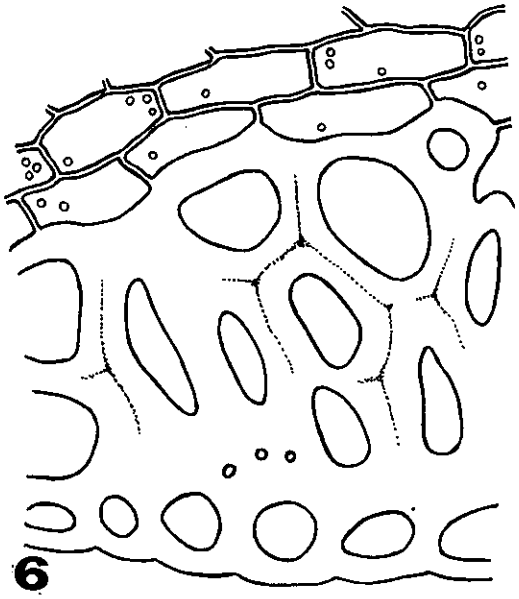
In a young capsule which is easy to make sections, all the cells in layer-I and-II are somewhat sclerified (Fig. 4, 5). The cells in layer

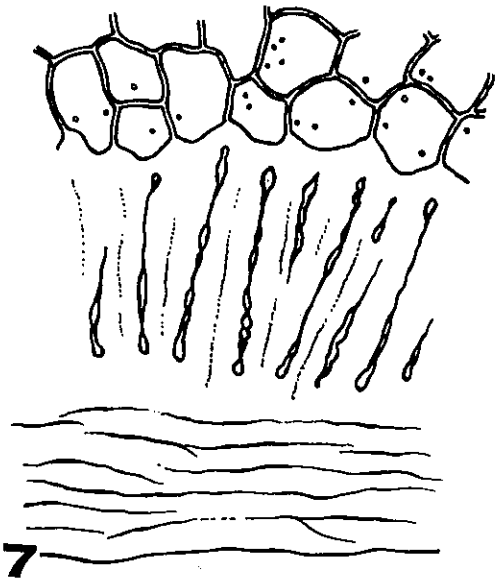












Figs. 2-7. Cell feature in area studied (locule beneath each figure). 2, Area-a of ovary. 3, Area-c of the same with Fig. 2. 4, Area-a of young fruit. 5, Area-c of the same with Figz 4. 6, Area-a of nearly matured fruit. 7, Area-c of the same with Fig. 6. Figs. 2-4 and 6, ×445. Figs. 5 and 7, ×175

-I in area-c are further elongated in a tangential direction to a locule, whereas those in area-a are not elongated. The cells of layer-II in area-a have a tendency to elongate slightly in a radial direction from the central axis of locule (Fig. 4), while those in area-c are extremely elongated (Fig. 5) in the radial direction, being about 95 μm in length.

In a nearly matured capsule which is difficult to section, the cell walls in layer-I and-II become so thick that each cells, especially in area-c, can not be discerned (Fig. 7). In area-a, the cells walls of layer-III or of layer-III and-IV are as thick as those in layer-I and-II (Fig. 6).

In the ovary and the capsule, the transformation of the cell features in area-a to those in area -c occurs in area-b (Fig. 1, b) where is about 130 μm from the base of a septum between two adjoining locules.

Discussion

According to ESAU (1964), an ovary wall maturing into a pericarp of a capsule (in a large sense) shows considerable increase in the number of cells in some species, and little increase in others. It is unknown whether the two present *Rhododendron* species have such an increase or no. The cells of layer-I and-II in area-c were found to be extremely elongated in the direction tangential to and in the direction radial from the locule respectively. It is certain that this fact facilitates the increase in size through maturing of ovary into the fruit.

In a matured capsule, a septum between two contiguous locules is composed of a central narrow parenchyma and a sclerenchyma on each side of the parenchyma. Separation of septa from an axial column of a capsule occurs at inner ends of septa, that is, along the line by which both the inner ends of sclerenchyma in a single septum are joined. Each septum is divided into two halves along its central parenchyma, that is, along the line of union of contiguous carpels. A pericarp consists of an outher part of parenchyma and an inner part of sclerenchyma. As the capsule becomes dry, the back of each carpel is warped by a much stronger differential shrink in the outer part than in the inner part. This warp facilitates a further separation among carpels from the tapering capsule top towards the thick base. Then, it can be said that the dehiscence in the capsule of the two *Rhododendron* species includes a septifragal and a septicidal dehiscence.

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摘　要

サツキとトサノミツバツツジとで，子房が果実（さく果）へと成熟するにつれて出現する厚膜組織が観察された。観察はすべて子房および果実の横断面によった。心皮の向軸面表皮（胎座部分のそれを除く）を第Ⅰ細胞層とし，順次背軸面へ向かって第II，III，IV細胞層とよぶが，これら以外の細胞層には厚膜化はみられなかった。

子房では，その中軸に近い第Ⅰ細胞層の細胞はほぼ正方形であるが，子房の周囲壁での細胞は子房の切線方向にやや長くなっている。若い果実では第Ⅰと第II層の細胞に低度の厚膜下がみられ，果実の周囲壁では第Ⅰ層細胞は果実の切線方向にさらに伸び，第II層細胞は放射方向に極端に伸びている。完熟に近い果実においては，その中軸近くでは第Ⅰ～IIIまたはⅠ～IV層細胞で，果実の周囲壁では第Ⅰと第II層細胞のみで，細胞壁が極端に厚くなっている。子房または果実の中軸近くと周囲壁とで，上に述べたように細胞の状態で異なった点があるが，この移行は胞間壁の基部から約130μmのところで緩やかにすすんでいる。

上述の厚膜組織と柔組織の配置により，果実の開裂は胞間壁の内端（胞軸開裂）と2隣接心皮の結合線（胞間開裂）とでおこる。

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○ **水草研究会**　本会は水草に関する研究および知識の普及と会員相互の親睦をはかることを目的としている。水草に興味を持たれる方の御入会を御奨めする。年会費2,000円。振替口座京都5-16477。会報は12号まで発行されていて，内容は水草に関する論文・報告の他，文献目録に多くの紙面が使用されている。（里見信生）