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COMPARISON OF PHLOEM IN PRIMITIVE AND ADVANCED PLANTS

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ABSTRACT

In the series of plants, some cells called Lipoids are seen in some algae and mosses that these cells act as vascular, but they are not comparable to wood and sieve by no means. In fact, no specified vascular system is needed in plants without vascular because these plants live in moist environments. However, by the conversion of plants to drought and creating thick trunks and long height, a system is needed to take the water and transfer it from the bottom to up and deliver the made organic material called phloem sap from up to bottom. The transfer system of phloem sap in the plant is calledsieve tissue or phloem. Comparisons between the sieve units of more primitive and more advanced groups show that more primitive groups have sieve cells, different origin for annex and sieve cells, limited symplastic connection, and narrow sieveholes. In the advanced group, sieve elements, common origin for annex and sieve cells, very high symplastic connection, and flared sieveholes are observed.

Keywords: Symplastic connection, phloem sap, phloem, Lipoids.

INTRODUCTION

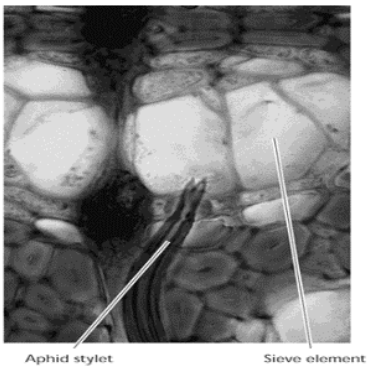
Sieve Units in Red and Brown Algae:

Central cells have been elongated in red and brown algae and act as a sieve. The origin of sieve units is independent of neighboring cells (Figure 1). Large and multiple communications have been created in the Pit section on the cross wall. Chloroplasts and the big nucleus have polar arrangement inside the protoplast cell. Callus can be seen in the old sieve units, and it has a symplastic connection with symplastic arrangement. During puberty, phloem has a slightly larger vacuole than the young units. Nuclear and plastid are destroyed, but mitochondria are remained [1].

Sieve Units in Mosses:

Sieve units in mosses are some cylinders around gametophyte stem xylem, and they are connected to very long parenchymal cells in the form of crescent rows. As sieve units in algae, the cell wall begins to become thicken in the early stages of growing, and it foundsspecific apparent characteristics (Figure 1). During puberty, Endoplasmic reticulum is marginalized in the form of masses, and refractive erythrocytes (equivalent to protein bodies) are present in the endoplasmic reticulum. Erythrocytes' membrane is torn apart during puberty, and proteins are scattered toward the cytoplasm and pass through the sieve pores. Mitochondria are present, but plastid is little and sometimes is attached to starch granules. Microfilament and protein do not exist in mosses. The characteristic of this group is the presence of small-scattered vacuoles, which are not connected during puberty, and they do not make a central vacuole [1].

Sieve units do not have an Antogenic connection with annex parenchyma in mosses. Annex cells are assigned for a part of metabolic functions (rich organelles, intense metabolism, and symplastic connection with sieve units). Sieve hole diameter is equal to the size of plasmodesmata, but it does not act as the proprietary plasmodesmata (mediocre symplastic connection). They do not have a callus. Membrane strings are attached to the endoplasmic reticulum, and they pass sieve chambers [1].



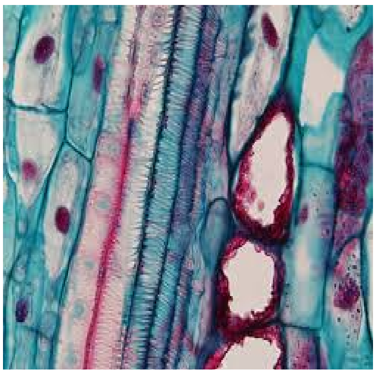


Figure 1: Sieve element in the brown algae (figure on the left). Sieve element in the moss (figure on the right).

Sieve Units in Vascular Cryptogam:

In vascular cryptogam, the preterm sieve is between both central pillars of the preterm wood. In addition, preterm xylem is attached to the preterm sieve in the inner and outer parts. Sieve units in long vascular cryptogam are 30-40mm, and they have a slightly sloping bottom wall, sieve cells, and rinsed tubes [2].

During puberty, autophagy and cell maturation (survival) are observed. Ribosomes, tonoplast, Golgi apparatus do not have Microtubules and Microfilament, and they have an untouchedplasma membrane, plastid, and mitochondria. Endoplasmic reticulum has a margin, which is involved in the production of refractive erythrocytes. Protein bodies are surrounded by a membrane, and they are marginal. Identification of sieve units is done by parenchymal cells adjacent to refractive erythrocytes [3,4]. The symplastic connection is varied. They are distributed in individual species on the wall (prevailing form), and in other classifications, they are seen in sieve zone in the final wall. Narrow symplastic connection is in the range of 5μm with other sieve units, and they have plenty symplastic connections with parenchymal cells (holes in the narrow sieve units and toward the individual parenchymal plasmodesmata and without connections). High metabolic activity is observed in cells [1,2,5].

Sieve Units in Gymnosperms:

Gymnosperms have sieve cell, sieve elements, and sieve tube. Sieve cell has a same degree of specialization on the wall. These cells have no function, and they become a storage of phenolic materials in the way of dealing with pathogens and invasive insects such as Pinus Abies). Sieve tube is alive, but they do not elongate due to not having core, and they are not able to control their genetic and mitochondria activities. Specialized parenchymal cells (strasburger) are assigned to transfer Photosynthetic materials from mesophilic to inside and outside sieve units. Plasmodesmata are replaced by open holes (symplastic). Sieve elements are converted to a structural and functional unit along with annex cells [6].

Core decomposition is occurred during puberty (they are not completely decomposed and the core is remained in the form of a body with confused chromosomes and nuclear envelope), and they have plastid (the type P in pine and the S type in other conifers taxans. Plastids' role is still not clear, but they disintegrate in response to injury, and they may have the role of wound closing like Dicotyledons. They have more decomposed organelles compared with the lower groups (endoplasmic reticulum and microtubules and Microfilament). By the severe loss of matrix, endoplasmic reticulum remains in the marginal form and ribosomes (its value is higher in young units). The reduction of small holes is seen during puberty. Sieve holes are tight by callus. Specialization of connection in sieve units is seen with parenchymal cells (strasburger). Strasburger cells have mitochondria, lobed nucleus, ribosomes, severe metabolic and transcription. Strasburger cells have an origin different from sieve cells [1,6].

Sieve Units in Angiosperms:

Growing the sieve zone holes in angiosperms is like gymnosperms, but no callus sheet is observed in growing the holes. During puberty, cytoplasmic is decomposed. Tonoplast and core are completely destroyed, and there is no cytoskeleton, ribosomes, and dictyosome. There is only a thin layer of marginal cytoplasm, a small amount of endoplasmic reticulum, and mitochondria. There are special plastids of sieve unit and protein (Figure 2) [7].

During antogenic, the amount of protein gets high (especially, in monocotyledons, palm, and grass), and they are dispersed during puberty, and they are placed in the marginal form. There is no dispersed protein in 10% of Dicotyledons, and protein in beans is like the specific crystalline spindle. Vascular bundles are dispersed in monocotyledons, and they are developed just in the initial growth. Protein exists in monocotyledons and dicotyledons, but it is not seen in lower plants. Connections in angiosperms are done through sieve sheets with large holes, which create various shapes with their arrangement. Sieve section holes have developed plasmodesmata in annex cells. When, the common be formed in the middle layer, the center hole is created in the hole (similar to gymnosperms) [1].

Metabolic activity of sieve cells depends on the activity of annex cells. Annex cells and sieve cells have a common origin. Phloem parenchymal cells in dicotyledons are often compressed andwithout performance. In rinsed elements, only the primary wall is seen, which is in the form of a layer or sheet and consist of cellulose and pectin with different thickness. GVGs genes are involved in growing xylems and phloem that xylem has 19 genes and phloem has 5 genes from the 63 genes.Dicotyledons have a grown secondary vascular system through the secondary growth [8].

Special features of some families:

In Cyperaceae family, vascular bundles are lateral. Metawylem and phloem are great, and there are many parenchymal groups around the vascular bundles. In the drought-adapted plants, there are largethin-walled epidermal cells that increase the water capacity [9]. In chenopodium, phloem units are relatively small and the rinse tube is thin [10]. There are specified crystals of P proteins in bean species, which are often characterized by filament tubes or P protein granules. In tomato and broad bean, organelles seem to be marginal, and they are attached by a peg to the plasma membrane. In tomato, stem vascular bundles are developed during restoration, and callus is also developed in the rinsed sheet zone [1].

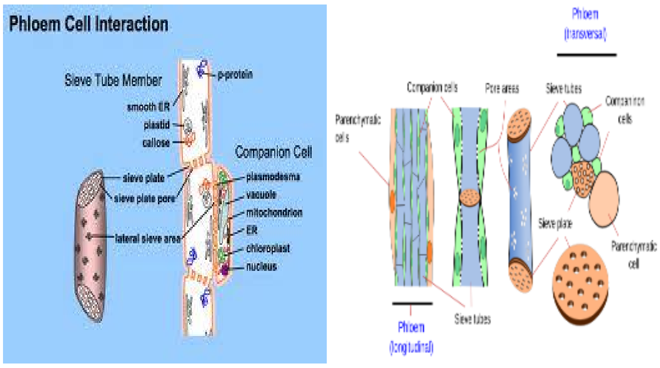


Figure 2: Phloem in gymnosperms (figure on the left). Phloem in angiosperms (figure on the right).

CONCLUSION

Comparison between the sieve units of more primitive and more advanced groups in term of Antogenic shows that more primitive groups have rinsed cells, more organelles in puberty, different origin for annex and sieve cells, limited symplastic connection, and narrow sieve holes, and p proteins, callus, plastid are not seen. In advanced group, a few organelles in the margin of the cell, common origin for annex and sieve cells, very high symplastic connection, flared sieve holes, high P protein especially in the margin of the cell, callus deposition to create sieve holes, and special plastids are observed [1].

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