C203 Occurrence, Type and Ultrastructure of Calcium Oxalate Crystals in Panax ginseng

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Crystalline calcium oxalate occur throughout nearly all plants species in five major forms ; styloids, druses, raphids, prisms and sands. These crystals are known to be distributed in specific tissue such as cortex, xylem, phloem, cambium and epidermis. This research was undertaken to identify the occurrence, type, location and ultrastructure of calcium oxalate crystals in Panax ginseng. Rubeanic acid-silver nitrate test, in situ visualization, conventional light microscopy and scanning electron microscopy were applied for this purpose. Calcium oxalate crystals in ginseng are occurred in nearly all plant organs such as leaf, petiol, pedicel, stem, rhizome, tap root and lateral root. Especially we observed no crystals in fine root, but most abundant crystals in rhizomes. Calcium oxalate crystals are thought to be indirectly co-related with lipid synthesis, because of the occurrence of idioblasts near lipid duct. Two types of ultrastructurally identifiable druse crystals in root will be reported.

C204 Ultrastructural Degeneration of the Root Tip Cells during Lead Induced Apoptosis in Zea mays

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Programmed Cell Death(PCD) is a physiological process occurring during development and in environmental conditions of plants, and apoptosis has been designated as the degenerating morphology of the nucleus and chromatin fragmentations. This research was undertaken to determine the ultrastructural changes of cell organelles in the root tip during lead induced apoptosis. Conventional electron microscopy was applied to the root tip after germination of the Zea mays in the Hoagland solution containing 10M, 100M, 1mM, 10mM of lead nitrate. The third phase, degenerating phase, of PCD has begun by increase of the number and size of the vacuoles containing electron dense inclusions. Nucleolus, nuclear membrane, starch grains were much more resistant to high concentration of lead nitrate comparing the other cytoplasmic cell organelles. Fragmentation of the tonoplast, condensation of the nuclear lamina were also observed at this phase of PCD. These cellular degenerations were particularly observed in the cells of periblem, and plerome was thought to be less sensitive with environmental interaction than periblem in seedlings of Zea mays.

C205 전자현미경을 이용한 우상 규조류 Achnanthes brevipes의 규각 구조 관찰;

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*Achnanthes brevipes*는 우상 규조류의 raphid 그룹으로 heterovalvar의 특징이 있다. 본 연구에서는 주사 및 투과 전자현미경을 이용해 *A. brevipes*의 규각 미세구조를 관찰하였다. *A. brevipes*는 한 쪽의 규각(하각)에 등줄이 있으며 중앙볼록마디의 양쪽으로 분리되어 있다. 등줄의 중앙 끝부분은 곧으며 서로 같은 방향으로 약간 굽어져 중심구멍이 있다. 등줄의 양쪽 끝부분은 고리모양으로 현저하게 한 방향으로 굽어져 있다. 등줄이 없는 규각(상각)은 등줄이 있는 규각에 비해 약간 부풀어진 모양이다. 등줄의 맞은 편에는 돌출맥이 있어 그곳을 중심으로 그물눈들이 뻐대모양으로 배열되어 있다. *A. brevipes*의 전체 외형은 등줄의 위치에 따라 다르게 등줄이 정중앙에 위치할 때는 땅콩모양, 한쪽으로 치우쳐 위치할 때는 볼록한 타원모양이다. *A. brevipes*의 양쪽 규각에는 그물눈들이 고르게 배열되어 있고 각각의 그물눈 내에는 막성 구

조물들이 규칙적으로 배열되어 있다. 막성 구조물들은 땅콩모양과 콩모양의 두 가지 형태로 보이고, 이것은 뚜껑의 이중적인 구조에 의한 것으로 생각된다.

C206 Electron microscopy of epidermal idioblasts in Lycopersicon esculentum stem

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Scanning electron microscopy was used for monitoring developmental purposes and to provide more information on the origin of the epidermal idioblasts in *Lycopersicon esculentum* stem. In particular, the study focused on two unique features, the raised stomata and the trichomes. In addition to typical anomocytic stomata, well-developed actinocytic raised stomata were distinguished. Five to six subsidiary cells radially surrounded the stomata that were raised, ca. 100-200 ㎛ above the surface level. Four types of trichomes were also noticed : 1) four-lobed glandular head with a stalk cell; 2) ca. 400-500 ㎛ slender hairs with clavate tip; 3) ca. 70-100 ㎛ short hairs with warty texture; and 4) ca. 2.5-4.0 ㎜ long multicellular hairs with 15-20 basal cells arranged in the rosette form as conically elongated hairs. Development of such actinocytic raised stomata along the epidermal surface remains unknown. Hence, a complete ultrastructural analysis will be conclusive and is the subject of a subsequent investigation.

C207 Morphology of trichomes and stoma-like structures in the anisophyllic fern species

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Salvinia lacks true roots and produces two leaf forms, floating leaves (FL) and rootlike submerged leaves (SL), thus exhibiting the anisophylly. The compound SL have little in common with the FL developmentally. The upper frond surface is covered with close parallel rows of large multicellular estipitate trichomes that make the leaf buoyant. A function of these trichomes, egg-beater form unfused at the tip, is clearly the prevention of wetting. The lower epidermis is invested with multicellular filaments, each terminating in an acicular cell with small balloon-like appendage attached to the base. They might function in absorption or in stabilizing the plant. Dense, multicellular but simple trichomes also dorsally covered the filamentous SL. They are much longer and also contain small balloon-like appendage at the base. Small stomata-like pores, ca. 100-130/㎟, are scattered evenly over the upper FL epidermis. The size is ca. 15 10 ㎛ and the aperture alone is ca. 8×5 ㎛. The nature of the pores as true stomata is doubtful, although each is bordered by tiny guard cell-like structures. No defined system of guard cells and the vestigial nature have been speculated.

C208 Molecular and Ultrastructural studies on Fertilization and Sex Determination in *Aglaothamnion oosumiense* (Rhodophyta)

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During the fertilization in *Aglaothamnion oosumiense*, reproductive cells interact with each other through sex specific adhesion molecules on surface of spermatia and trichogyne. Recognition molecule of spermatia brings trichogyne into close contact and initiates a signal transduction pathway in preparation for cell-cell fusion. Spermatial development and fertilization process of A.