

Micromorphological features of sclerotia of *Cenococcum* spp. collected from low pH forest soils

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A black spheric resting body, sclerotium, of *Cenococcum* spp. persists in forest soils for a long time while functioning as a substrate for diverse fungi even though the ability to germinate has been lost. ^[1] Sclerotia grains frequently found from soil and sediment are the scientific interests in paleopedology, geochemistry, sedimentology, and geology, with a different viewpoint from soil microbiology. Fungal sclerotium, or sclerotinite, together with sphoerosiderite, pyrite framboid etc., were grouped as some common constituents of coal and waterlogged paleosols. ^[2] Sclerotia grains collected from the bottom sediment of the Lake Biwa, Central Japan was ascertained as the possible origin of perylene in sediments. ^[3]

We carried out micromorphological observation of sclerotia *Cenococcum* spp. collected from low pH forest soils in Japan to gain knowledge of the microenvironment inside of sclerotia grains. By SEM/TEM-EDX analyses, the needle ball structures, determined as boehmite, were found as common structures formed on cell walls of sclerotia grains. Besides such Al polymorphs, Si spherical structures, estimated as opaline silica, were observed inside the grains. A spherical fraction with a diameter of 100 nm was recognized as the unit particle of the substrate of sclerotium grains, which predominantly contained C and Al, and suggested their existence as melanin-like particles. Graphite and graphene-like fractions were observed in sclerotia grains, and the graphene-like fractions co-existed with Ti oxides or small amounts of adhering Ca, Mg, or Fe oxides.

[1] Obase *et al.* (2014) *FEMS Microbiol Ecology* **90**: 708–717. [2] Retallack (1990) Cambridge University Press. [3] Itoh *et al.* (2010) *Geochimica et Cosmochimica Acta* **85**,241-251.