

A comparative study on crystal vacuole formation of amoebae

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In order to compare the difference in crystal formation between *Amoeba proteus* and *Polychaos dubium* collected from a natural freshwater pond, a study was performed using a light microscope, transmission electron microscope (TEM), scanning electron microscope (SEM), and X-ray microanalyser. The cytoplasm of *A. proteus* contained numerous small crystals 2–3 μm in length and bipyramidal in form, and that of *P. dubium* contained numerous large crystals 20 μm in length and of a plate-like rectangular form. Using the same organism as food did not change the shape, size or number of crystals in the two amoebae. For SEM observation and X-ray microanalysis, 50 individuals of each amoeba and white cells of *Paramecium bursaria* as a food organism were placed on the carbon specimen holder, and were naturally dried and then coated with carbon. We found that the crystals of *A. proteus* were composed of two types, one as described above, and another which was small, granular, and 0.1 μm in diameter. The elemental composition of both crystal types was the same and consisted mainly of carbon and oxygen, with small amounts of phosphorus, potassium, chlorine, and sulfur. The crystals of *P. dubium* were also of two types, but the plate-like rectangular crystals varied from 6–20 μm . In addition, many small granular crystals or clumps thereof adhered to the surface of these crystals. The plate-like rectangular crystals were composed of carbon and oxygen, and the small grains were mainly composed of carbon, oxygen, phosphorus, calcium and magnesium, with small amounts of sulfur, chlorine, and potassium. The elemental composition of small-grain crystals in *Paramecium bursaria* was the same as that of the small crystals of *P. dubium*. The variation in the plate-like crystals of *P. dubium* indicates that they gradually increase in size, while the crystals of *A. proteus* remain constant in size and shape. Because the elemental composition of the crystals of the amoebae and the paramecium were different, it is probable that the crystals and small grains were synthesized within each cell.