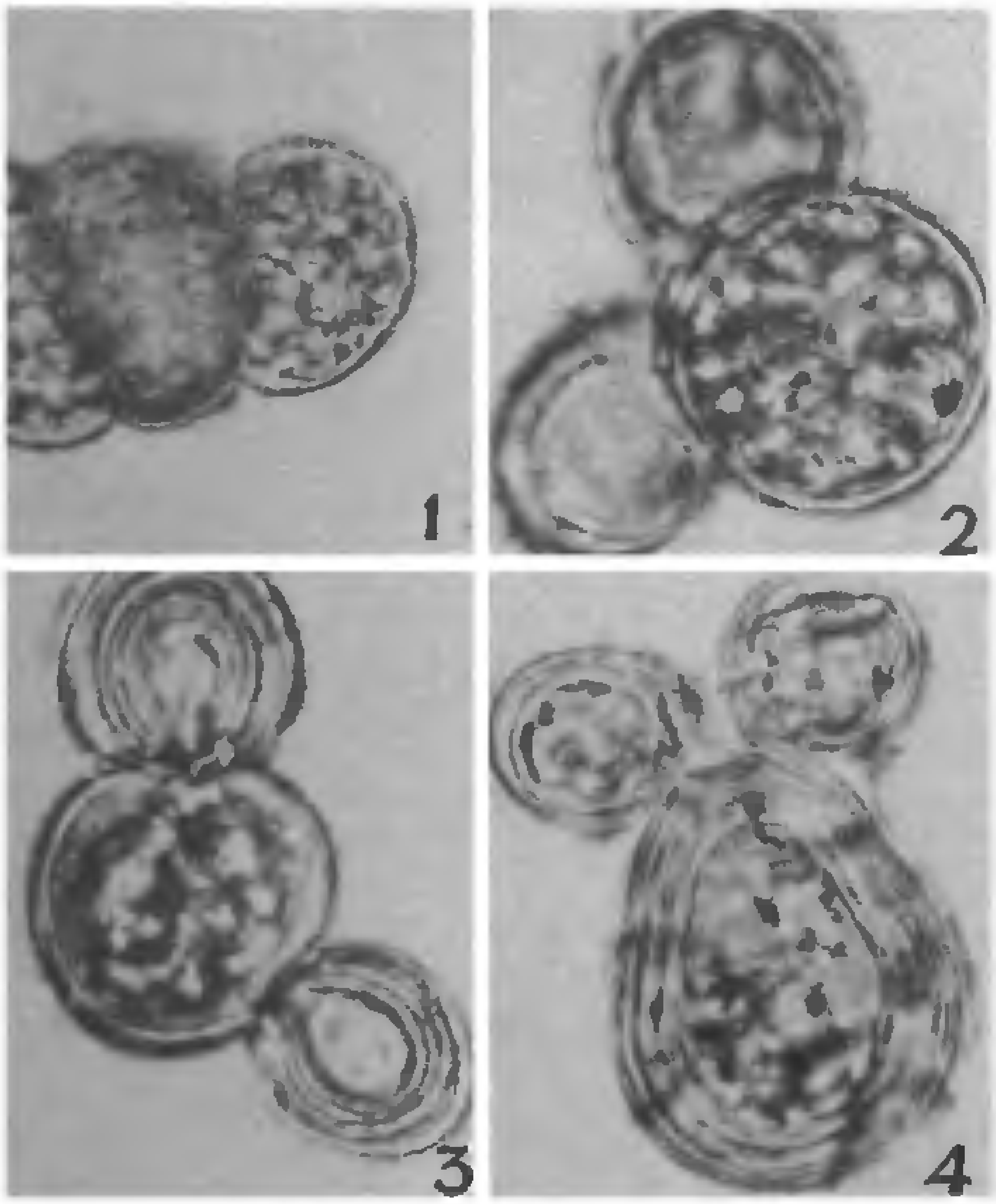
tigation. But the frequency of parthenospore formation was greater in constant light at 27–29°C and in soil extract medium. During the process of spore formation the two semicells break open at the isthmus region and the contents emerge into a layer of mucilage (figures 1 & 2) secreted by the cell, round off and form a resistant wall (figures 3 & 4) which is exactly similar to the zygospore in its external appearance. A similar emergent type of parthenospores was reported earlier in *Cosmarium botrytis*[5] and in *C. bioculatum*[2]. In the zygospore formation, two conjugants are involved and the contents emerging out of these two cells will fuse, round off and secrete mucilage. Thus, the process of zygospore formation is quite different from that of parthenospore formation. Moreover, the thick striated wall of the parthenospore is not seen in the zygospore.

The occurrence of these parthenospores in *C. laeve* along with zygospores might be due to the abortion of one of the gametes during the process of conjugation.



Figures 1–4. Showing the parthenospore formation in *Cosmarium laeve*, Rabenh. × 3000. **1.** The protoplast in between two separated semicells. **2, 3.** Spherical parthenospore. **4.** Fully mature parthenospore surrounded by thick, striated mucilage sheath.

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PROTEIN BODIES IN THE EMBRYO OF *CROTALARIA RETUSA* LINN—THEIR STRUCTURE AND DEVELOPMENT

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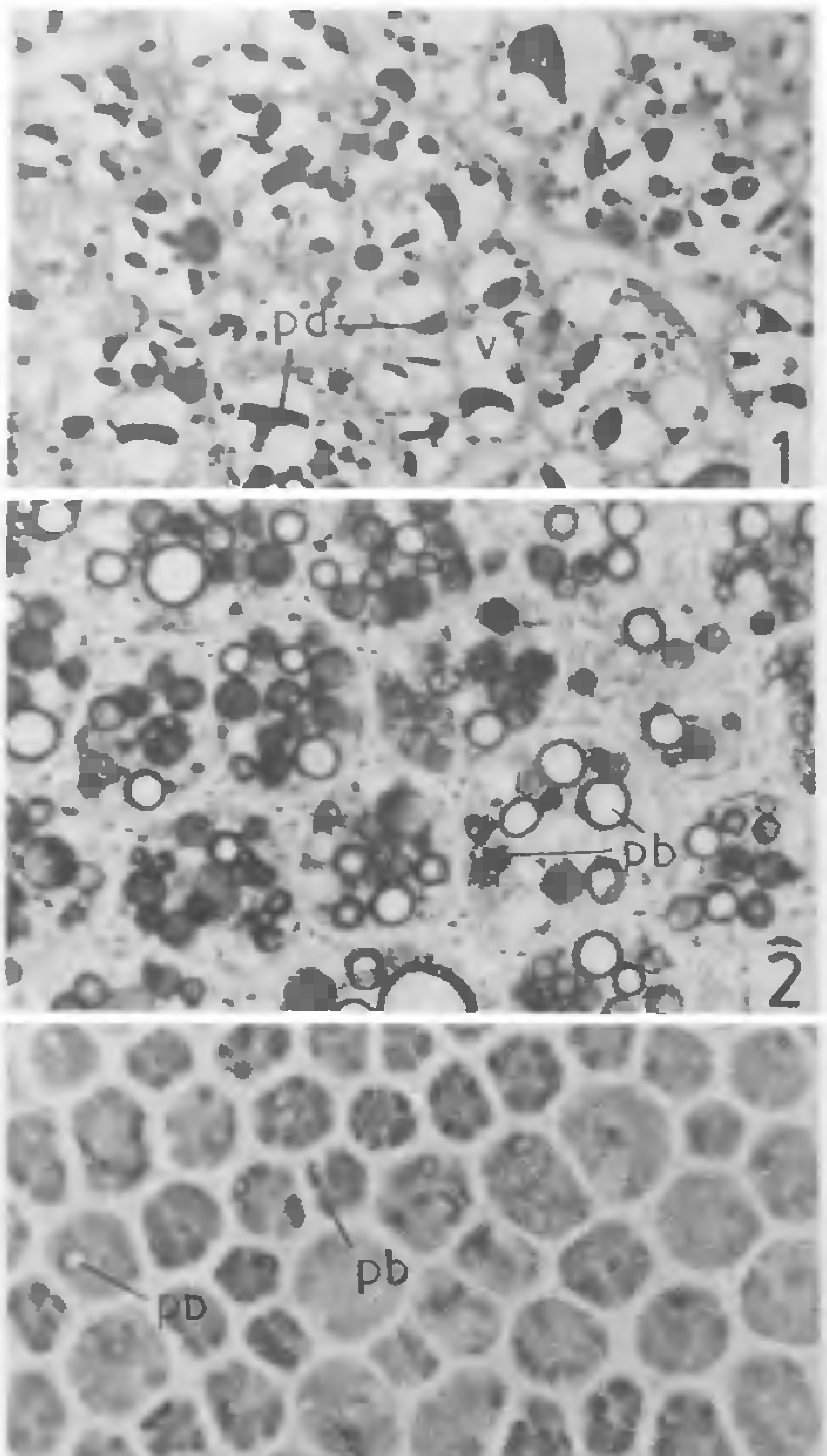
THE protein bodies are oval to spherical organelles, bound by a single, unit membrane and in seeds are repository of storage proteins[4]. In the cereals, protein bodies occur largely in endosperm cells whereas in the legumes, these bodies are localized in the cells of the embryo axis and the cotyledons. Present investigation on *Crotalaria retusa* deals with the structure and development of protein bodies that occur in parenchyma cells of the embryo axis and the cotyledons.

The seeds, during various stages of development were fixed in 10% aqueous acrolein, dehydrated, infiltrated and embedded in glycol methacrylate[2]. Two μm sections were cut using glass knives and stained with coomassie brilliant blue (BDH, C.I. No. 42660) for the localization of total proteins[3].

In *C. retusa* protein bodies are formed from vacuoles. The parenchyma cells of the embryo axis and the cotyledons, during embryogenesis, are highly vacuolated. Each cell consists of a large central vacuole with peripheral cytoplasm. During seed maturation, the central vacuole, by cytoplasmic projections, is compartmentalized into many small vacuoles. The proteins are, simultaneously, deposited on the vacuolar rim as lens-shaped masses (figure 1). The protein deposits, during later stages, fuse and form a ring of proteins on the vacuolar rim (figure 2). The vacuoles gradually become filled with a homogenous mass of proteins and form protein bodies (figure 3). The protein bodies in this taxon have little inclusions.



Figures 1–3. Formation of protein bodies in the cotyledonary cells (pb, protein body; pd, protein deposit; v, vacuole.) × 690. **1.** Portion of cotyledonary parenchyma cell, 25 days after anthesis, to show the presence of lens-shaped masses of protein on the vacuolar rim. **2.** Same, 35 days after anthesis, to reveal a ring of proteins at the vacuolar surface and various stages in the illing-up of protein bodies with proteins. **3.** Portion of cotyledonary parenchyma cell, 40 days after anthesis, to show protein bodies filled with homogenous mass of proteins. A few protein bodies are still in the process of development.

The legume cotyledons, during development of seeds, synthesize and store proteins which approximately account for 25 % of seed dry weight[1]. In *Vigna unguiculata*[5], *Pisum sativum*[1] and *Vicia faba*[6] structural studies of developing cotyledons have revealed that large vacuoles present early in development acquire small peripheral deposits of protein and form gradually small membrane bound protein bodies[1].

The protein bodies, on the basis of the kind of inclusions present, are classified into three categories[7], (i) those lacking inclusion, (ii) those with only globoid inclusion and (iii) those with both globoid and crystalloid inclusions. The protein bodies of *C. retusa* belong to the first category and ontogeny supports the vacuolar origin of this organelle.

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