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Coelomogenesis and Nutrition of Clonally Produced Asteroid Larvae

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Asexual reproduction by planktotrophic larvae of asteroids is an unusual life history strategy exhibited by several species in the families Luididae, Oreasteridae, Ophidiasteridae, and Asteriidae. Larvae of the former three families reproduce asexually in the field, while the asteriid *Pisaster ochraceus* has produced clones when larvae are reared in the laboratory. Our knowledge of the processes involved in larval cloning and the biology of the developing clone is fragmentary in nature. We used light, electron, and scanning laser confocal microscopy to study clones that develop through paratomy of the posterolateral larval arms. The archenteron forms by a modified form of gastrulation that is mediated by large numbers of mesenchyme cells as reported by Bosch et al. (1989). Coelomogenesis is by enterocoelly through outpockets of the clonal archenteron. The results of experiments designed to trace the movement of the protein ferritin in larval tissue revealed that clonal embryos may be nutritionally dependent on the primary larva. Organic materials assimilated by the primary larva are translocated through the blastocoelic compartment and accumulate differentially in actively clonal arms suggesting a stronger skin for blastocoelic nutrients compared to nonclonal arms. At the early bipinnaria stage clones are capable of feeding through the capture of particles and assimilation of dissolved proteins from water. By the time they separate from the primary larva the clones are morphologically indistinct from sexually produced bipinnariae of equivalent size.