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THE LIFE-CYCLE OF *PELTOGASTERELLA GRACILIS*
(RHIZOCEPHALA, CIRRIPIEDIA)

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The Rhizocephala are not hermaphrodites, but are females with extremely modified hyperparasitic larval males (Ichikawa and Yanagimachi 1958¹⁾, 1960²⁾). The females of *Peltogasterella gracilis* (= *P. socialis*)³⁾, although they all look alike, are in reality of two genetically different kinds, the male-producing and the female-producing. The male-producing female possesses 30A chromosomes and produces large eggs with 15A chromosomes. These eggs are fertilized by spermatozoa from the cypris-cell receptacles and develop, within the maternal mantle cavity, into large nauplius larvae. These nauplii have 30A chromosomes. The newly hatched nauplii undergo three successive moults and transform themselves into large cyprii. They are attracted to the juvenile females and affix themselves to the mantle opening. They do not simply attach to the mantle opening, but inject their internal cellular contents, through the antennules into the mantle cavity of the juveniles. The implanted cellular masses migrate through the cavity and eventually enter the cypris-cell receptacles where these cells multiply and transform themselves into spermatozoa with 15A chromosomes. These cyprii are the so-called larval cypris males which have been often misnamed the complementary males.¹⁾

The female-producing female has 30A + X chromosomes and produces small eggs, half of these possessing 15A + X chromosomes and the other half possessing 15A chromosomes. These eggs are fertilized by spermatozoa and develop into small nauplii. Half of these nauplii have 30A chromosomes and the other half have 30A + X chromosomes. Externally, these two genetically different kinds of larvae show no visible structural difference. Both of these two kinds of small nauplii undergo three successive moults and transform themselves into small cyprii. These cyprii seek for the young host crabs (the hermit crab, *Pagurus lanuginosus*, and some others) and attach to the surface of the crabs' body. They are prospective females. The female cypris injects its internal cellular contents, through one of its antennules, into the body of the host. During a long, completely endoparasitic

existence, each female which at first appears as a minute mass of undifferentiated cells constructs two major parts, i.e. root system and sac-like portion containing differentiated ovary. When the host crab moults, the endoparasitic female emerges from the host's body, leaving the root system inside the body of the host. Thus, the female becomes partially exoparasitic and partially endoparasitic. The juvenile female at this stage awaits the arrival of the larval cypris males. When it receives the cellular materials of the males into its cypris-cell receptacles, it begins to grow rapidly. The juvenile female with $30A + X$ chromosomes develops into female-producing female, and the female with $30A$ chromosomes develops into male-producing female. After the last batch of larvae has been extruded, the external sac-like portion wrinkles up and falls off from the host's abdomen, leaving the root system. The root system may produce new external sac-portions by a process of budding.⁴⁾⁵⁾

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