

Mammals not the only animals to feed embryo during gestation

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How and when does mom feed her embryo? We humans, like most mammals, experience pregnancy where a mother supplies nutrition directly to the embryo as it develops. But we're in the minority.

Most members of the [animal kingdom](#) supply eggs with nutritious yolk before they are fertilized. With this yolk supply, fertilized eggs develop as embryos in the environment outside the mother's body. For over a century, the scientific understanding of matrotrophy ("mother-feeding") of an embryo developing inside a mom's body has come from [vertebrate animals](#), especially mammals like us. This process was thought to be infrequent among the other 33 or so major groups or phyla of animals. Not so, according to a major study published today in the journal

Biological Reviews.

Scott Lidgard at Chicago's Field Museum and Andrey Ostrovsky at St. Petersburg State University led the international team that reports matrotrophy has evolved in at least 21 of 34 animal phyla. By comparing the examples of matrotrophy with the placement of species on the DNA-based tree of life, the authors propose that matrotrophy has evolved independently in 140 or more different animal lineages, and is often associated with live birth. According to the study, previous work scattered through the specialized scientific literature had talked about matrotrophy in many invertebrate groups, but it had never been appreciated just how common it might be, and how frequently it had evolved. There are more species of flatworms that employ mother-feeding than there are species of mammals!

The repeated shifts from ancestors whose embryos depended entirely on yolk to descendants in which moms supply nutrients directly, either partly or wholly supplanting yolk, is only part of the story. Animals have evolved a host of different mechanisms for carrying out the job of feeding the embryo: direct transfer with intimate cellular contact as in placental mammals, uterine "milk glands" in scorpions and some insects, nutrient secretion into fluid-filled body cavities where embryos are freely suspended, accelerated development of embryo digestive tracts that allows feeding on maternal tissues, even cannibalism of sibling eggs or embryos.

Mechanisms among [invertebrate animals](#) are less complex than among vertebrates, but are more diverse. We know a lot, for example, about what enables a human baby with a different genotype than its mother to develop in intimate contact with the placenta without triggering an attack by mom's immune system on the "foreign" body. How have independently evolved modes of mother-feeding in different animal groups eluded or accommodated dangerous immune responses?

Many of the invertebrate groups with matrotrophy remain stuck on the ocean floor for most of their lives, or are parasites that live part or most of their existence inside other host organisms. Vertebrates have neither of these life histories. If matrotrophy has evolved dozens or hundreds of times among distantly related animal groups, what factors of animal physiologies, life histories, and environments have shaped the course of natural selection? The sheer diversity of mothers feeding embryos shown by this study points toward a whole range of scientific questions for which animals other than mammals may hold the keys.

Provided by Field Museum

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