f27 Cyclical evolution of developmental stages

< early developmental stages do evolve >

... with birds singing on the bushes, with various insects flittering about, with worms crawling through the damp earth, ... —Darwin.[1]

Nothing in biology makes sense except in the light of evolution.[2] ... It is wrong to hold creation and evolution as mutually exclusive alternatives, I am a creationist and an evolutionist. Evolution is God's, or Nature's, method of Creation.[3]
—**Theodosius Hryhorovych Dobzhansky** (1900-1975) in troubling context.

If it wasn't for bad luck, I wouldn't have no luck at all.
—Booker T. Jones & William Bell, Blues Lyric: *Born Under A Bad Sign*.[4]

Complex larval structures can be lost more easily than they can be gained during evolution. This surprising result comes from a study of starfish of the genus *Patiriella*. Stages of development in several of its species are:

planktonic dispersal and larval feeding —tiny eggs released to drift in the sea develop into flop-limbed free swimming larvae that feed before transforming into tiny crawling stars.

viviparity —large, yolky eggs are produced that develop directly into starfish with no intervening larval phase.

parental brood protection —embryos are retained in the gonad and of the developing juveniles, those that cannibalize the weaker are the champions born.

Patiriella non-feeding larval types derived from ancestral planktonic feeding types occurred at least three times (***Figure f27.1***). Reversions from the release of feeding types is selection in hard times for parental brood protection and viviparity. This observed back and forth evolution is a more reasonable expectation according to Richard R. Strathmann in 1978,[5] and examined by Clifford W. Cunningham in 1999,[6] than the 1800s perception, which inadequate observations allowed, of linear developmental sequences. False is the generalization, attributed to Karl Ernst von Baer (1792-1876),[7] that early developmental stages resist evolutionary change more than do later stages. ❑

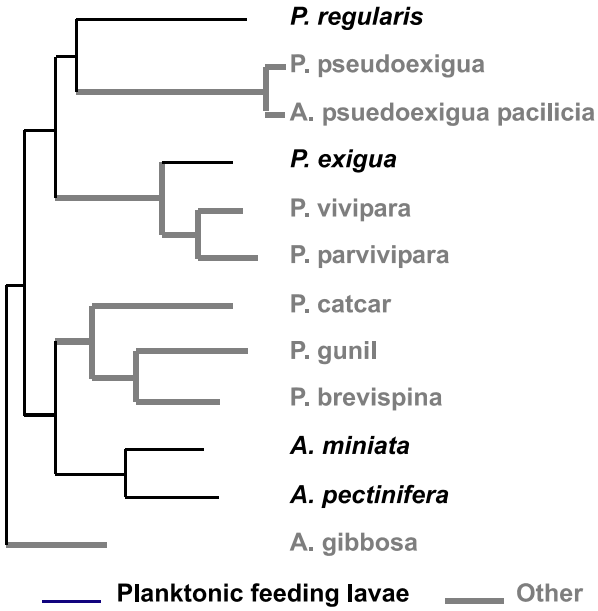

Figure f27.1 [8]

Phylogenetic relationships among 13 species of the starfish *Patiriella* and *Asterina*.

Footnote f28.1

Sorites (Gk. *sros*, heap) is a name for the logical puzzle of deciding when not-F becomes F when a gradual process of change leads from one to the other:

> One grain of sand does not make a heap. Adding a single grain to what is not a heap does not make it a heap. Therefore, nothing is a heap. But in usage, heap is a word with meaning and application.