

Epigenetic processes, when *natura non facit saltum* becomes a myth, and alternative ontogenies a mechanism of evolution

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Preamble

When I started the journal 'Environmental Biology of Fishes' more than 25 years ago, it was designed to avoid any prejudices and scientific dogmas, to keep an open mind, and to allow publication of ideas that are irritating to followers of the so-called 'mainstream', ideas that few other journals dared to touch (Balon 1976, 1989d). While such articles in the journal were often ignored by the 'mainstream' practitioners and the political establishment, none was ever opposed or proven wrong. As in many similar cases before, only time will show if these contributions were valid and of value to the advancement of knowledge.

I have often wondered why it takes so long for some of the universal facts and ideas to be accepted or even to be known. I have come to believe that like with many textbooks some facts and conclusions are copied from one book to the next (as in the case of the origin of the common carp – Balon 1974, 1995a,b) without knowing or admitting that in the meantime new facts require new syntheses and conclusions. Even good scholars resist unknown facts or ideas. It is irritating that one's knowledge is inadequate or that others beat us to be first. I have wondered why wrong ideas persist for so long; but Bateson (1979, p. 206) already explained it to his daughter '... yes, your image of evolution is exact. And what Darwin called "natural selection" is the surfacing of the tautology or presupposition that what stays true longer does indeed stay true longer than what stays true not so long'.

After all it was Jean Baptiste 'Lamarck, the founder of evolutionary theory, miserable, old, and blind, ...' (Bateson 1972, p. xii) and/or Gottfried Treviranus who presented the truth long before the privileged Charles Darwin, alas in 'wrong' languages. Over time, ignoring the truth became fashionable and the question which of the four theories of evolution (Løvtrup 1982) can be attributed to Darwin, if any, irrelevant. 'It is' [exclaims Croizat 1977, transl. 1987, p. 137] 'a gross, very grave mistake to confuse Darwin as a *historical figure* with Darwin as an *exalted figure of the thinking of biology*' (Croizat's italics).

Nearly 30 years ago a BBC TV series and book on evolution glorified Darwin and molecular biology. Calder (1973, p. 9), the author of this book entitled 'The life game: evolution and the new biology' felt that Darwin 'would [merely] need to know about the survival of the quickest, when it came to crossing the street'. But the street was never crossed! Many TV viewers of the recent PBS series 'Evolution' were again misled into believing that evolution was discovered by Darwin. Even Gould (2001) in the 'Introduction' and the producer Hutton (2001) in the 'Foreword' to the companion book of this series (Zimmer 2001) give the 'Darwinian evolution' [sic] an exposé it hardly deserves. While such views have been repeatedly proven wrong, most scholars, with the exception of a few scientists, philosophers, and journalists, comfortably assume Darwin's priority in spite of numerous published evidences to the contrary. This myth is then fed to the general public. The following retrospective essay attempts to compile proofs in support of the evolutionary processes other than Darwin's natural selection and the gene-centric 'new synthesis', old by now as it is.

Synopsis

Populations of phenotypes which form a species occur only at various stages of individual ontogenies. A single cell, the egg, cannot be in the same stabilized state as a differentiated multicellular embryo or reproducing adult. The entire ontogeny must, therefore, consist of a sequence of stabilized states. Ontogeny of a phenotype cannot progress gradually but is a saltatory homeorhetic system, proceeding via natural thresholds from one self-organized state to the next, hierarchically ever more complex and specialized. A choice between two stabilities on one level in this organized system of change may result in bifurcations into more indirect and more direct ontogenies, maintenance and dispersal phenotypes, generalists and specialists, or simply as I prefer to call it all – altricial and precocial forms. Like the wave-particle duality in physics, life processes use bifurcations to create both novelties and alternative answers, to be ready when required at any interval of ontogeny and evolution. The bifurcations at various times of epigenesis, inter alia, sum-up into two different sequences of ontogeny, one more generalized, the other more specialized – the altricial \rightleftharpoons precocial homeorhetic states. These states are channelized via bifurcations into different self-organized and stabilized intervals, until change or extinction become inevitable as a result of lost variation during the constant tendency to specialize. The ability to maintain altricial and precocial forms in every generation lineage makes it possible at any time to have two answers prepared for any future unknown environment. If certain epigenetic changes persist for generations in a suitable environment and become isolated, a new evolutionary unit (e.g., species) may be assimilated. These epigenetic interactions of the internal and external environments of a developing individual are the primary mechanisms responsible for the maintenance of the initial taxa as well as for the formation of every new taxon.

Introduction

‘... the large majority of historians and philosophers of science excel in glorification of Darwin as the founder of *the* theory of evolution, a theory which is believed to have prevailed to the present day. By adopting this stand they are joining forces with the opinion acclaimed by the professional biologists. And what else can they do? If the biologists cannot themselves find out that the ruling orthodoxy is false, how can we expect outsiders to do the job for them?’

Søren Løvtrup (1987, pp. 419–420)
in *Darwinism: the refutation of a myth*

Most of the ideas presented in this essay started to be developed and published about 30 years ago (e.g., Balon 1975a,b, 1979a,b, 1980). Since that time innumerable treatments of ontogeny and evolution have been compiled, too many to list here, but in none even a hint of similar ideas emerged. Notwithstanding later repetition and reviews of these ideas (Balon 1983, 1985, 1986a,b, 1988a,b), again these were mostly ignored, in spite that some of them have been in the meantime incorporated in major textbooks or reviews of ichthyology (Goto & Maekawa 1989, Holčík et al. 1989, Holčík 1998, Bond 1996, Moyle & Cech 1996). The reason given by the late Humphry Greenwood (1990, p. 532) was that their

presentation was ‘sometimes complex’, but the true reason, I suspect, was elegantly explained by Reid (1985, p. 358): ‘... the belief that unreconstructed neo-Darwinism is the all-sufficient explanation of evolution illustrates a survival of the polemically fittest’. Greenwood’s (1989) sophistry dealing with my ‘theory of saltatory ontogeny’ and Gould’s (e.g., 2001, p. ix) recent strong support of ‘Darwinian evolution’ (now claiming that ‘what Mr. Darwin said is clearly true’) in contrast to his earlier anti-Darwin opinions (e.g., Gould 1980), are good examples of the surreptitious state of the affair (see also Balon 2002).

In the meantime numerous volumes on evolution alternated between a strong disagreement with the ‘new synthesis’ also called ‘neo-Darwinism’ (e.g., Hitching 1982, Ho & Saunders 1979, 1984, Reid 1985, Laszlo 1987, Augros & Stanciu 1987, 1988, Gottlieb 1992) and a firm support of the ‘new synthesis’ (e.g., Ayala & Valentine 1979, Milkman 1982, Ruse 1982, Mayr 1988, 2001, Hecht 1989, Ridley 1993). The bilingual Italian journal *Rivista di Biologia* (later also *Biology Forum*) under the open-minded editorship of Giuseppe Sermonti turned at that time into a flagship for those who disagreed with the pretense that the ‘new synthesis’ is finished, complete and all-inclusive (see Sermonti 1999 and selection of articles in *Rivista di Biologia/Biology Forum*, vol. 92, no. 3), but again remained conspicuously ignored for the most part by the ‘hardened Darwinians’.