

## **How the Leopard Changed Its Spots.**

"Clearly something is missing from biology!"

review *by* Gert Korthof 01-01-1998 (updated: 11 Mar 2001)



### "How the Leopard Changed Its

### Spots"

by Brian Goodwin.

Phoenix

1994,1995

233 pages.

illustrated

- 1. Whatever happened to organisms?
- 2. How the leopard got its spots
- 3. Life, an excitable medium
- 4. Living in the making
- 5. The evolution of generic forms
- 6. New directions, new metaphors
- 7. A science of qualities

References

Index

Goodwin is highly critical of Darwinism, without being creationist. His book is valuable for Darwinists as well as for creationists, because it shows how a scientist who rejects the *sufficiency* of Darwinism, tries to improve Darwinism in a scientific way.

Goodwin is a critic of evolution, who analyses the shortcomings of the Darwinism; who wants to improve the theory of evolution and actually proposes improvements. He goes deep into Darwinist assumptions, and puts his finger on what are unjustified simplifications in the theory of the development of an organism.

The paradigm of design: The eye

A good example is the eye. "How could random mutations gradually build up such a complex organ like the eye?" is the question Goodwin asks himself. As did almost every creationist. Creationists concluded design, Goodwin suggests that the development of eyes in evolution is not improbable at all. The basic process of animal morphogenesis lead in a perfectly natural way to the fundamental structure of the eye. (p147). Goodwin studied mathematics and embryology. He knows what he is talking about. He knows that embryology has insights in the development of organs quite different from the Darwinist toolbox of random mutations and natural selection. Embryologists begin to understand how organs develop and what is necessary to modify an organ. They know that there is more than genes and gene-products (1). There are morphogenetic fields, which add a spatial and temporal dimension to the development of forms. They help to understand what forms are possible, what forms are stable and probable and what forms are unstable and improbable. This kind of information we need, because in evolution anything can happen, any form could emerge. We need to know more about which forms are improbable to happen; we need to know about constraints on forms. That will give us a theory which is able to explain and predict new forms in evolution. Exactly that is missing in current evolutionary biology.

# What is wrong with Darwinism?

- 1. Darwin transformed biology from a rational science that sought intrinsic principles of biological order, into an historical science in which virtually any form is possible (p132)
- 2. neo-Darwinism added genetic reductionism, but organisms cannot be reduced to the properties of their genes (p3).
- current evolutionary biology fails to explain the origin of novelties because the absence of a theory of morphogenesis.
- 4. Darwin's theory works for small-scale aspects of evolution, but there is no significant support for gradual accumulation of small hereditary mutations adding up to large-scale aspects of evolution.

The last point is exactly the same criticism that creationists like <u>Denton</u> and <u>Johnson</u> have. The difference is, that Goodwin understands that we need a theory of morphogenesis to explain macro-evolution. Goodwin does not doubt that all organisms share a common ancestor. He does not reject evolution. He rejects the claim that neo-Darwinism is sufficient. Creationists reject the theory of evolution, but the difference is that they don't want a *scientific* solution for a scientific problem. If they reject also the fact of evolution, then they have no need for an alternative theory at all. Therefore the search for a better scientific theory discriminates scientists from creationists.

Contrary to the title of the book, Goodwin does not explain how the leopard got its spots. There is an explanation with a computer model how the alg *Acetabularia* got its whorls. It is one of the most detailed examples of Goodwin's method of explaining forms in biology. The book is well illustrated with drawings and color images.

About the author: Brian Goodwin studied biology at McGill University, Montreal. He came to Britain on a Rhodes Scholarship to Oxford where he read mathematics. He took his PhD at Edinburgh, having researched in embryology with the eminent biologist C.H. Waddington. He has been Professor of Biology at the Open University since 1983.

Brian Goodwin published with Gerry Webster:

Form and Transformation: Generative and Relational Principles in Biology, Cambridge Univ Pr (Short), Hardcover - 287 pages, 1996.

**Book Description:** 

Darwin's theory of evolution by natural selection fails to explain the forms of organisms because it focuses on inheritance and survival, not on how organisms are generated. This book argues that biology needs a theory of biological form, and that this must be based on a generative theory of organisms as developing and transforming entities of a distinctive type (fields). A number of examples are presented and used to explain the logical relationships of biological forms that underlie biological classification schemes, based upon the properties of complex dynamic systems.

Ricard Sole and Brian Goodwin(2000):

Signs of Life: How Complexity Pervades Biology.

review: Scientists' Bookshelf Sept/Oct 2001 of American Scientist.

### **Notes**

We needed embryologists (developmental biologists) like Walter Gehring to prove that 'morphogens', 'morphogenetic fields'
and 'positional information' are neither mystical nor mathematical principles, but can be explained by genes and geneproducts. See: Master Control Genes in Development and Evolution. The Homeobox Story, page 35, 87. See also: Enrico
Coen: The Art of Genes. How organisms make themselves.

### Links:

- See another review on this site for a discussion of the Fibonacci series which Goodwin discussed in chapter 5.
- See for a discussion of the relation between developmental biology and The neo-Darwinian Synthesis the <u>review of</u> Smocovitis' book on this site.
- Goodwin's home site

### **Further Reading:**

- Wallace Arthur(2000) The Origin of Animal Body Plans: A Study in Evolutionary Developmental Biology Cambridge Univ Pr (Pap Txt), Paperback, - 352 pages Book description:
  - The neo-Darwinist body of evolutionary theory occupies a dominant position in biological thought but it lacks a component dealing with individual development, or ontogeny. This lack is particularly conspicuous in relation to attempts to explain the evolutionary origin of the 35 or so animal body plans, and of the developmental trajectories that generate them.
- Philip Ball(2001) *The self-made tapestry. Pattern formation in nature*.

  The idea that natural selection cannot create every form in nature is also found in this beautifully illustrated book. The alternative explanation of form is by physical, mechanical and mathematical laws (very much like Brian Goodwin did). (see the first chapter of the book).

korthof@wasdarwinwrong.com	home: www.wasdarwinwrong.com	http://home.planet.nl/~gkorthof/kortho23.htm
Copyright © 1998 G.Korthof .	First published: 01-01-1998	Last update: 26 Jan 2002