



The Self-Made Tapestry: Pattern Formation in Nature

By Philip Ball

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For centuries, scientists have struggled to understand the origins of the patterns and forms found in nature. Now, in this lucid and accessibly written book, Philip Ball applies state-of-the-art scientific understanding from the fields of biology, chemistry, geology, physics, and mathematics to these ancient mysteries, revealing how nature's seemingly complex patterns originate in simple physical laws.

Tracing the history of scientific thought about natural patterns, Ball shows how common presumptions--for example, that complex form must be guided by some intelligence or that form always follows function--are erroneous and continue to mislead scientists today. He investigates specific patterns in depth, revealing that these designs are self-organized and that simple, local interactions between component parts produce motifs like spots, stripes, branches, and honeycombs. In the process, he examines the mysterious phenomenon of symmetry and why it appears--and breaks--in similar ways in different systems. Finally, he attempts to answer this profound question: why are some patterns universal? Illustrations throughout the text, many in full color, beautifully illuminate Ball's ideas.

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Editorial Review

Amazon.com Review

Seashells are often spirals, just like water going down the drain. There *must* be a connection, right? Our intuition scoffs at such a notion, but maybe they are related, writes *Nature* editor Philip Ball in *The Self-Made Tapestry: Pattern Formation in Nature*. This deep, beautiful exploration of the recurring patterns that we find both in the living and inanimate worlds will change how you think about everything from evolution to earthquakes. Not by any means a simple book, it is still completely engaging; even the occasional forays into mathematics and the abstractions of hydrodynamics are endurable, tucked as they are between Ball's bright prose and his hundreds of carefully selected illustrations.

When speaking of the living world, Ball seeks to go beyond the theory of natural selection, which explains *why* we see certain characteristics (height, shape, camouflage), to find mechanisms that can explain *how* such characteristics come to be. Again, this is no easy task, but for those willing to follow his discussion, the elegance of nature is laid out in zebras' stripes, ivy leaves, and butterfly wings. Moving on to find the same patterns at work in the clouds of Jupiter and the cracks in the San Andreas fault give strength to the feeling that there are self-composing structures that guide everything in the universe toward a kind of order. *The Self-Made Tapestry* is a challenging look at the biggest issues in science, and well worth a thorough read. --
Rob Lightner

From Publishers Weekly

Most people—including most scientists—take it as a given that the appearance of complex patterns implies conscious planning on the part of an intelligent agent or, in the case of such patterns in the biological world, the stringent application of the forces of natural selection. Ball (*Designing the Molecular World*) challenges these assumptions directly, documenting the counterintuitive idea that the operation of simple physical laws often yields complex and beautiful, but wholly natural, patterns. Ball's range is quite impressive. He discusses pattern formation on the hides of zebras, giraffes and leopards; the creation of honeycombs by bees; the uncanny similarities between branching patterns in plants and mineral dendrites of magnesium oxide. Ball also demonstrates how the same physical laws can operate on dramatically different scales: the same pattern of wave propagation has been found both in newly fertilized frog eggs and in nascent spiral galaxies. Despite fascinating material such as that, Ball's text is highly technical and often abstruse—so much so that it may prove inaccessible to most nonscientists—other than the comprehensible captions on the more than 400 photographs and line drawings (24 in color), that is, which make this a book that's at least worthy browsing for general readers.

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From Library Journal

As an editor at *Nature*, Ball (*Made To Measure: New Materials for the 21st Century*, LJ 11/15/97) is in an excellent position to take an interdisciplinary look at the patterns in the world around us, be they formed by the elements, flora, fauna, or humans. The underlying physical constraints that bring order out of randomness are explored without the burden of lengthy mathematical formulae. Ball shows us how similar patterns can arise in remarkably different situations and how slight changes in variables produce a startling array of patterns within the same systems. Though other books on fractals and chaos theory share similar topics, this work does a remarkable job of presenting the hows and whys. From how the leopard got its spots to how Jupiter acquired its own spot, this readable and well-illustrated book has answers. A series of do-it-yourself demonstrations is presented in seven appendixes. Recommended for larger public and academic libraries. AWade Lee, Univ. of Toledo Libs., OH

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