"**Complexity: The Emerging Science at the edge of order and chaos",** by M. Mitchell Waldrop, Penguin, Pounds 7.99, (1995).

How did the primordial soup of amino acids and other molecules organize themselves into a living cell? How do galaxies and other structures form in the universe when there is an inexorable tendency towards disorder? Why do stockmarkets booms and crashes occur when they occur? How did the intricate structures like the eye and brain form?

Reductionist science, which has held sway from the time of Newton has been unable to answer these questions satisfactorily. Not that it has not been successful in increasing our understanding of the universe. After all, it has brought us to a stage where the basic chemical reactions, or the basic physics underlying these intriguing processes is fairly well understood. And it has put a man on the moon!

Its inability to deal with all the above questions and other similar ones can be fundamentally traced back to a common feature of all these systems; all of them are complex systems, where the behaviour of the whole is not necessarily derivable from the behaviour of the individual parts which make it. Be it the living cell, or the economy, each one of these have numerous "agents"(molecules in one case and human beings in the other) which interact with each other and organize spontaneously into structures whose dynamics are unusual. The dynamics which emerges at the edge of chaos is new and very rich in structure.

The study of this dynamics has been termed as complexity. This, as the eminent particle physicist Murray Gell-Mann points out is a misnomer. The whole field is a study of simplicity, complexity and complex adaptive systems where the simplicity of the underlying rules is a crucial feature. He suggests the name plectics, from the Greek word meaning braided.

In 1984, Gell-Mann alongwith M.G.M. Cowan of Los Alamos National Labs and others started the Sante Fe Institute. The institute (which some tremendous a haven for bored physicists!) has been the meeting point of a number of workers from many fields sharing an interest in exploring complex systems. The approach is essentially inter-disciplinary with computer scientists, neurobiologists, physicists and economists collaborating to gain insights into the new emerging dynamics of complexity.

Waldrop has written a wonderful account of the emergence of this new challenger to the reductionist paradigm. He offers a coherent, lively and compelling picture of this extraordinary intellectual adventure. Starting with the founding of the Sante Fe Institute, he goes on to discuss the work of some of the key players in the game. These include the biologist S. Kaufmann, the computer scientist Chris Langton (the "progenitor" of Artificial Life), the economist Brian Arthur (who pioneered the work on increasing returns) and the physicists D.Farmer(one of the pioneers in chaos). The book weaves together the personal lives of these scientists and their work. One feels emotionally involved with the researchers while sharing their intellectual excitement. The prejudices of establishment academia to radical ideas, the rejection of papers in journals, the wheeling-dealing in the funding process, is all there. The whole book is gripping though at the end of it one feels that Waldrop should have given us a slightly more detailed account of the science behind it rather than concentrating so much on the biographical details.

Having ruled unchallenged for more than three centuries, reductionist science is now facing its biggest challenge in complexity. The new paradigm is potentially capable of revolutionising not only the way we do science but also our whole thinking. The world, or the universe may not anymore be as simple as we thought. On the other hand, the incredibly complex system that our universe is may well turn out to be amenable to scientific investigation.