

PREFACE

Amid all the recent interest in complexity, many point out that the future of science belongs more to biology, the study of complex systems, than to physics. Few beings, reader, are more complex than you. In this book we argue that to understand the true complexity of life—the main source of evolutionary novelty Charles Darwin sought—one must understand how organisms come together in new and fascinating ways, and how their genes are donated and acquired. This then will be the story of how species, and speciation itself, evolved through the acquisition of genomes. With more than a century of observation and experimentation by scientists around the world, and intense communication among them, let us now explain how new species come into being.

Neither an omnipotent deity nor fantastic good luck enters into it. The story that begins with Jean Baptiste Lamarck's studiousness, Charles Darwin's data, Gregor Mendel's garden peas, James Watson's willfulness, and Francis Crick's lack of humility ends, with a species of romantic irony, in the muck and slime. Its protagonists are speedy, determined bacteria and expert protist architects on a tectonically active Earth under an energetic sun. Wars, alliances, bizarre sexual encounters, mergers, truces, and victories are the dramas. Random DNA mutations, primarily destructive in their effects, account only for the beginnings. The role of randomness has been exaggerated in the evolutionary saga. Drugs,

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