

Table of Contents

Foreword	xi
Translator's Preface	xv
Preface	xvii
Chapter I Introduction	1
The earliest ideas about the place of animals in nature. Myths and philosophies of ancient people.	
Chapter II Aristotle	7
The earliest notions about the analogies and homologies of organs – Correlative forms – Establishing divisions within the animal kingdom – The concept of species – The principle of continuity – Degrees of perfection of the organs – Possibility that the forms of animals might be transformed.	
Chapter III The Roman Period	15
Lucretius: Formation of the earliest organisms; the struggle for life. – Pliny: attributed marvelous things to animals; the nature and origins of marine monsters; notions about anatomy. – Elien, Oppien, and Galen: Progress in anatomy; correlations between the external form of animals and their organization and behavior.	
Chapter IV The Middle Ages and Renaissance	21
Arabian medical doctors. – Alchemists. – Albert the Great. – The first great voyages. – Renaissance of anatomy. – Belon, Rondelet. – Francis Bacon. – Progress in physiology and anatomy. – The first micrographs. – Prejudices that reigned until the XVI th century.	

Chapter V Evolution of the Concept of Species	27
The great descriptive works: Wotton, Gessner, Aldrovandi. – Ray: definition of species. – First attempts at nomenclature. – Linnaeus: the fixity of species; binomial nomenclature.	
Chapter VI Philosophers of the XVIIIth Century	33
Charles Bonnet: the scale of living creatures; global revolutions; the past and future states of plants, animals, and humans; the preformation [emboîtement] of germ cells – Robinet: his ideas about evolution. – De Maillet: fossils. – Erasmus Darwin: transformation based on epigenesis. – Transformation of animals under the influence of habitat; analogies between Lamarck and Darwin. Maupertuis: the roll of matter in transformations. – Diderot: the life of species and the life of individuals.	
Chapter VII Buffon	47
Buffon's opposition to classifications because they necessarily lead to transformation. – The utility of artificial systems. – Geographical distribution of animals. – Probability of modifications in species. – Extinct species: the struggle for life. – Opposition to the doctrine of ultimate causes. – The principle of continuity.	
Chapter VIII Lamarck	59
The importance of the lower animals – Spontaneous generation – Gradual perfection of organisms; the influence of needs and habits – Heredity and adaptation – Transformation of species during earlier geological periods – The absurdity of global cataclysms – Importance of ordinary every-day processes – Genealogy of the animal kingdom – The origin of man.	
Chapter IX Etienne Geoffroy Saint-Hilaire	73
The opposed doctrines of fixity and variability of species. – A unified plan of composition – Importance of the rudimentary organs – Balancing the organs – Analogy of the lower animals to the embryos of higher animals – Arrested development – Monsters and teratology – Geoffroy's ideas about the variability of species; abrupt transitions; influence of the environment – Extension of the theory of the unified plan of composition of articulated animals: return of the vertebrates; the ideas of Ampère – Genetic links between fossils and living species.	
Chapter X Georges Cuvier	87
Affinities with Linnaeus; the influence of Cuvier on scientific work; global revolutions; theory of successive creations and migrations. – Cuvier's inferences. – The order of appearance of animals; special creation	

- of the principal groups. – Natural classification: adherence to the principle of ultimate causes; the principle of environmental conditions; law of the correlation of forms; law of subordination of characteristics.
- The four major branches of the animal kingdom.

Chapter XI Debate between Cuvier and Geoffroy Saint-Hilaire 99

Attempts to extend the theory of a uniform plan of composition to molluscs. – Cuvier's opposition; what is the meaning of such a uniform plan? – The relationships between embryology and epigenesis are clarified. – Cuvier's insistence on the pre-existence of the germ cells. – Von Baer and the four types of development. – The school of ideas versus the school of facts. – The influence of Geoffroy Saint-Hilaire, Cuvier, and Lamarck.

Chapter XII Goethe 109

Goethe's thoughts on the unity of types of organization. – Metamorphosis and structure of plants: the ideal plant. – Studies of comparative anatomy; research on the ideal type of skeleton. – Goethe's conception of descent with modification [transformisme] – Kielmeyer.

Chapter XIII Dugès 115

Attempts to reconcile the ideas of Cuvier and Geoffroy Saint-Hilaire – Organic conformity in the scale of animals life – Moquin-Tandon and the zoonite theory – Dugès' generalizations of this theory – Theory of the constitution of organisms: law of modification and complication, law of coalescence – Dugès' ideas about the types of organisms.

Chapter XIV The German Natural Philosophers 127

Schelling's ideas. – Oken: polarities and the origin of the universe. – The primitive mucus. – Equivocal generation of the infusoria, anatomical elements. – The law of repetition deduced from natural philosophy. – Man and the microcosm. – Degrees of organization. – Theory of the vertebrates; constitution of the cranium as vertebrae. – Spix: application of the law of repetition to comparative anatomy. – Carus: Extension of the theory of vertebrates.

Chapter XV The Theory of the Organic Types and its Consequences 139

Richard Owen – the archetypal skeleton. – Analogy, homology, homeotypes. Theory of the vertebrate segment. – The ideal vertebrate; the existence of God. – Owen's views on Transformism. – Savigny: the uniform structure of the mouths of insects. – Audouin; the uniform structure of skeletons of articulated animals. – H. Milne-Edwards and the typical articulated

animal; fundamental identity of the zoonites; significance of the regions of the body; law of the division of physiological labor and its importance. – The growth of the body and agamic reproduction of the articulates; identity of these two phenomena; the significance of zoonites. – Parallels between the laws of the constitution of animals and the laws of political economics. – Studies of the lower animals: de Quatrefages, Blanchard, and de Lacaze-Duthiers.

Chapter XVI Louis Agassiz 157

Philosophical consequences of the hypothesis of fixity of species. – The possibility of setting up a classification that demonstrates the existence of God. – The existence of a plan of creation is inconsistent with the doctrine of transformism. – Arguments in favor of the fixity of species. – Weaknesses of these arguments. – Characteristics of the graduated zoological divisions. – A new definition of species. – Inconsistencies between this definition and observed facts. – The reality of species. – Causes of the physiological isolation of species.

Chapter XVII The Lower Animals 169

Progressive discoveries relative to the lower animals. – Trembley: the fresh-water hydra. – Peyssonnel: the corals. – Cuvier: the pennantule. – Lesueur: the siphonophores. – De Chaisso: the alternating generation of the salpas. – Sars: the alternating generation of the hydromedusas. – Steenstrup: a theory of alternating generations. – Van Beneden: digenesis. – Leuckart: polymorphism. – Owen: parthenogenesis and metagenesis. – M. de Quatrefages: geneogenesis. – Milne-Edwards' theory of reproduction. – General theory of the phenomena of asexual reproduction.

Chapter XVIII Cell Theory and the Constitution of the Individual 185

Pinel: the membranes. – Bichat: the tissues; their general properties. – Dujardin: the sarcode. – Schleiden: the cells of plants. – Schwann: extension of cellular theory to animals. – Prévost and Dumas: segmentation of the vitellus of the egg. – Studies of the origin of cells and anatomical elements of organisms; significance of the egg. – Definition of the cell; protoplasm and the plastids. Constitution of the simplest individuals. – Animal colonies; numerous transitions between colonies and the individuals of higher orders. – Isadore Geoffroy Saint-Hilaire: life in colonies as a sign of inferiority. – De Lacaze-Duthiers: difference between the invertebrates and vertebrates. – General theory of the individuality of animals.

Chapter XIX Embryology 199

Epigenesis and embryogenesis. – Harvey: influence of the cellular theory. – The egg considered as a cell. – Theory of blastodermic leaflets. – Exaggerated generalization of results obtained from studies of vertebrates. – Embryology from the point of view of histogenesis and organogenesis. – Serres and transcendent anatomy. – Embryology considered as transitional comparative anatomy. – Arguments supporting this theory. – Embryological Classification; their shortcomings. – The embryology of an organism is its condensed genealogy – Embryological acceleration; perturbing phenomena that result from it. – Links between embryogenesis, general morphology, and paleontology.

Chapter XX Species and their Modifications 211

A brief review of ideas concerning species. – The true nature of the problem of species; means of resolving this problem directly. – Attempts to find solutions indirectly. – Differences between races and species. – Proposed criteria for defining species and their limited usefulness. – The instability of hybrid forms: – Godron's theory. – Charles Naudin's experiments and theory. – Identity of race and species. – Isadore Geoffroy Saint-Hilaire: the theory of limited variability. – Comparisons of the doctrines of Isadore Geoffroy Saint-Hilaire and Charles Darwin. – Conclusions.

References 225**Glossary 229****Biographical Index 243****Index 259**