

Charles Darwin
**ON THE
ORIGIN
OF SPECIES**

[6th Edition]



全国百佳出版社
中央编译出版社
Central Compilation & Translation Press

Everyman's Library of Occidental Civilization

CHARLES DARWIN

ON THE ORIGIN OF SPECIES

[6th Edition]



中央编译出版社
Central Compilation & Translation Press

图书在版编目(CIP)数据

物种起源: 英文 / (英) 达尔文著.
—北京: 中央编译出版社, 2010.10

ISBN 978-7-5117-0525-9

I. ①物…
II. ①达…
III. ①达尔文学说—英文
IV. ①Q111.2

中国版本图书馆 CIP 数据核字(2010)第 163291 号

出版人: 和龔

责任编辑: 韩慧强

责任印制: 尹珺

出版发行: 中央编译出版社

地 址: 北京西单西斜街 36 号(100032)

电 话: (010) 66509360(总编室) (010) 66509405(编辑室)
(010) 66509364(发行部) (010) 66509618(读者服务部)

网 址: www.cctpbook.com

经 销: 全国新华书店

印 刷: 北京佳信达欣艺术印刷有限公司

开 本: 787 毫米 × 1092 毫米 1/16

字 数: 589.8 千字

印 张: 35.5 彩插 38 页

版 次: 2011 年 1 月第 1 版第 1 次印刷

定 价: 68.00 元

本社常年法律顾问: 北京大成律师事务所首席顾问律师 鲁哈达
凡有印装质量问题, 本社负责调换。电话 010-66509618



KNOW THYSELF

DELPHI is perhaps best known for the oracle at the sanctuary that was dedicated to Apollo during the classical period. According to Aeschylus in the prologue of the *Eumenides*, it had origins in prehistoric times and the worship of Gaia.

The Ancient Greek aphorism “Know thyself” was inscribed in the *pronaos* (forecourt) of the Temple of Apollo at Delphi. The aphorism has been attributed to at least six ancient Greek sages: Chilon of Sparta, Heraclitus, Pythagoras, Socrates, Solon of Athens and Thales of Miletus.



But with regard to the material world, we can at least go so far as this—we can perceive that events are brought about not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws.

—Whewell: *Bridgewater Treatise*

The only distinct meaning of the word “natural” is STATED, FIXED or SETTLED; since what is natural as much requires and presupposes an intelligent agent to render it so, i.e., to effect it continually or at stated times, as what is supernatural or miraculous does to effect it for once.

—Butler: *Analogy of Revealed Religion*

To conclude, therefore, let no man out of a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far or be too well studied in the book of God’s word, or in the book of God’s works; divinity or philosophy; but rather let men endeavour an endless progress or proficiencie in both.

—Bacon: *Advancement of Learning*

TABLE OF

 CONTENTS

PREFACE	I
INTRODUCTION	12
 CHAPTER I VARIATION UNDER DOMESTICATION	 17
Causes of variability	18
Effects of habit and of the use or disuse of parks; Correlated variation; Inheritance	22
Character of domestic varieties; Difficulty of distinguishing between varieties and species; Origin of domestic varieties from one or more species	26
Breeds of the domestic pigeon, Their differences and origin	30
Principles of selection anciently followed, and their effects	37
Unconscious selection	41
Circumstances favourable to man's power of selection	46
 CHAPTER II VARIATION UNDER NATURE	 51
Individual differences	53
Doubtful species	56
Wide-ranging, much diffused, and common species vary most	63
Species of the larger genera in each country vary more frequently than the species of the smaller genera	65
Many of the species included within the larger genera	



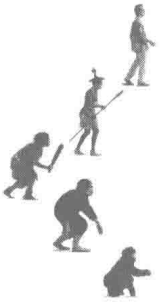
resemble varieties in being very closely, but unequally, related to each other, and in having restricted ranges	67
Summary	68

CHAPTER III STRUGGLE FOR EXISTENCE 71

The term, struggle for existence, used in a large sense	74
Geometrical ratio of increase	75
Nature of the checks to increase	78
Complex relations of all animals and plants to each other in the struggle for existence	81
Struggle for life most severe between individuals and varieties of the same species	85

CHAPTER IV NATURAL SELECTION;
OR THE SURVIVAL OF THE FITTEST 89

Sexual selection	98
Illustrations of the action of natural selection, or the survival of the fittest	100
On the intercrossing of individuals	107
Circumstances favourable for the production of new forms through natural selection	111
Extinction caused by natural selection	117
Divergence of character	119
The probable effects of the action of natural selection through divergence of character and extinction, on the descendants of a common ancestor	123
On the degree to which organisation tends to advance	131
Convergence of character	135
Summary of chapter	138



CHAPTER V LAWS OF VARIATION	141
Effects of the increased use and disuse of parts, as controlled by natural selection	144
Acclimatisation	149
Correlated variation	152
Compensation and economy of growth	155
Multiple, rudimentary, and lowly-organised structures are variable	156
A part developed in any species in an extraordinary degree or manner, in comparison with the same part in allied species, tends to be highly variable	157
Specific characters more variable than generic characters	161
Secondary sexual characters variable	162
Distinct species present analogous variations, so that a variety of one species often assumes a character proper to an allied species, or reverts to some of the characters of an early progenitor	164
Summary	171
 CHAPTER VI DIFFICULTIES OF THE THEORY	 175
On the absence or rarity of transitional varieties	177
On the origin and transition of organic beings with peculiar habits and structure	182
Organs of extreme perfection and complication	188
Modes of transition	192
Special difficulties of the theory of natural selection	196
Organs of little apparent importance, as affected by natural selection	204
Utilitarian doctrine, how far true: Beauty, how acquired	207
Summary: The law of unity of type and of the conditions of existence embraced by the theory of natural selection	212





CHAPTER VII MISCELLANEOUS OBJECTIONS TO THE THEORY OF NATURAL SELECTION	217
 CHAPTER VIII INSTINCT	 261
Inherited changes of habit or instinct in domesticated animals	267
Special instincts	270
Instincts of the cuckoo	270
Slave-making instinct	275
Cell-making instinct of the hive-bee	279
Objections to the theory of natural selection as applied to instincts: Neuter and sterile insects	288
Summary	295
 CHAPTER IX HYBRIDISM	 297
Degrees of sterility	299
Laws governing the sterility of first crosses and of hybrids	305
Origin and causes of the sterility of first crosses and of hybrids	312
Reciprocal dimorphism and trimorphism	318
Fertility of varieties when crossed, and of their mongrel offspring, not universal	322
Hybrids and mongrels compared, independently of their fertility	326
Summary of chapter	329
 CHAPTER X ON THE IMPERFECTION OF THE GEOLOGICAL RECORD	 333
On the lapse of time, as inferred from the rate of deposition and extent of denudation	336
On the poorness of palaeontological collections	341
On the absence of numerous intermediate varieties in any single formation	347

On the sudden appearance of whole groups of allied species	355
On the sudden appearance of groups of allied species in the lowest known fossiliferous strata	359
CHAPTER XI ON THE GEOLOGICAL SUCCESSION OF ORGANIC BEINGS	365
On extinction	370
On the forms of life changing almost simultaneously throughout the world	374
On the affinities of extinct species to each other, and to living forms	379
On the state of development of ancient compared with living forms	386
On the succession of the same types within the same areas, during the later tertiary periods	389
Summary of the preceding and present chapters	392
CHAPTER XII GEOGRAPHICAL DISTRIBUTION	397
Single centres of supposed creation	403
Means of dispersal	406
Dispersal during the glacial period	414
Alternate glacial periods in the north and south	420
CHAPTER XIII GEOGRAPHICAL DISTRIBUTION —CONTINUED	429
Fresh-water productions	430
On the inhabitants of oceanic islands	434
Absence of batrachians and terrestrial mammals on oceanic islands	438
On the relations of the inhabitants of islands to those of the nearest mainland	442



Summary of the last and present chapters 449

CHAPTER XIV MUTUAL AFFINITIES OF
ORGANIC BEINGS MORPHOLOGY

—EMBRYOLOGY—RUDIMENTARY ORGANS	453
Classification	454
Analogical resemblances	466
On the nature of the affinities connecting organic beings	471
Morphology	475
Development and embryology	481
Rudimentary, atrophied, and aborted organs	493
Summary	499

CHAPTER XV RECAPITULATION
AND CONCLUSION 501

APPENDIX: GLOSSARY OF THE
PRINCIPAL SCIENTIFIC TERMS USED
IN THE PRESENT VOLUME 531



PREFACE

—AN HISTORICAL SKETCH OF THE PROGRESS OF
OPINION ON THE ORIGIN OF SPECIES,
PREVIOUSLY TO THE PUBLICATION OF THE FIRST
EDITION OF THIS WORK

ON THE ORIGIN OF SPECIES By Charles Darwin

I WILL here give a brief sketch of the progress of opinion on the *Origin of Species*. Until recently the great majority of naturalists believed that species were immutable productions, and had been separately created. This view has been ably maintained by many authors. Some few naturalists, on the other hand, have believed that species undergo modification, and that the existing forms of life are the descendants by true generation of pre existing forms. Passing over allusions to the subject in the classical writers (Aristotle, in his *Physicæ Auscultationes*, lib.2, cap.8, s.2), after remarking that rain does not fall in order to make the corn grow, any more than it falls to spoil the farmer's corn when threshed out of doors, applies the same argument to organisation; and adds (as translated by Mr. Clair Grece, who first pointed out the passage to me), "So what hinders the different parts (of the body) from having this merely accidental relation in nature? As the teeth, for example, grow by necessity, the front ones sharp, adapted for dividing, and the grinders flat, and



serviceable for masticating the food; since they were not made for the sake of this, but it was the result of accident. And in like manner as to other parts in which there appears to exist an adaptation to an end. Wheresoever, therefore, all things together (that is all the parts of one whole) happened like as if they were made for the sake of something, these were preserved, having been appropriately constituted by an internal spontaneity; and whatsoever things were not thus constituted, perished and still perish." We here see the principle of natural selection shadowed forth, but how little Aristotle fully comprehended the principle, is shown by his remarks on the formation of the teeth. The first author who in modern times has treated it in a scientific spirit was Buffon. But as his opinions fluctuated greatly at different periods, and as he does not enter on the causes or means of the transformation of species, I need not here enter on details.

Lamarck was the first man whose conclusions on the subject excited much attention. This justly celebrated naturalist first published his views in 1801; he much enlarged them in 1809 in his *Philosophie Zoologique*, and subsequently, 1815, in the Introduction to his "Hist. Nat. des Animaux sans Vertebres". In these works he up holds the doctrine that all species, including man, are descended from other species. He first did the eminent service of arousing attention to the probability of all change in the organic, as well as in the inorganic world, being the result of law, and not of miraculous interposition. Lamarck seems to have been chiefly led to his conclusion on the gradual change of species, by the difficulty of distinguishing species and varieties, by the almost perfect gradation of forms in certain groups, and by the analogy of domestic productions. With respect to the means of modification, he attributed something to the direct action of the physical conditions of life, something to the crossing of already existing forms, and much to use and disuse, that is, to the effects of habit. To this latter agency he seems to attribute all the beautiful adaptations in nature; such as the long neck of the giraffe for browsing on the branches of trees. But he likewise believed in a law of progressive development, and as all the forms of life thus tend to progress, in order to account for the existence at the present day of simple productions, he maintains that such



forms are now spontaneously generated. (I have taken the date of the first publication of Lamarck from Isidore Geoffroy Saint-Hilaire's *Hist. Nat. Generale*, tom. ii. page 405, 1859) excellent history of opinion on this subject. In this work a full account is given of Buffon's conclusions on the same subject. It is curious how largely my grandfather, Dr. Erasmus Darwin, anticipated the views and erroneous grounds of opinion of Lamarck in his *Zoonomia* (vol. i. pages 500-510), published in 1794. According to Isid. Geoffroy there is no doubt that Goethe was an extreme partisan of similar views, as shown in the introduction to a work written in 1794 and 1795, but not published till long afterward; he has pointedly remarked (*Goethe als Naturforscher*, von Dr. Karl Meding, s. 34) that the future question for naturalists will be how, for instance, cattle got their horns and not for what they are used. It is rather a singular instance of the manner in which similar views arise at about the same time, that Goethe in Germany, Dr. Darwin in England, and Geoffroy Saint-Hilaire (as we shall immediately see) in France, came to the same conclusion on the origin of species, in the years 1794-5.

Geoffroy Saint-Hilaire, as is stated in his *Life*, written by his son, suspected, as early as 1795, that what we call species are various degenerations of the same type. It was not until 1828 that he published his conviction that the same forms have not been perpetuated since the origin of all things. Geoffroy seems to have relied chiefly on the conditions of life, or the "monde ambiant" as the cause of change. He was cautious in drawing conclusions, and did not believe that existing species are now undergoing modification; and, as his son adds, "C'est donc un probleme a reserver entierement a l'avenir, suppose meme que l'avenir doive avoir prise sur lui."

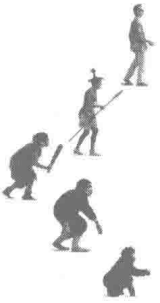
In 1813 Dr. W.C. Wells read before the Royal Society "An Account of a White Female, part of whose skin resembles that of a Negro"; but his paper was not published until his famous *Two Essays upon Dew and Single Vision* appeared in 1818. In this paper he distinctly recognises the principle of natural selection, and this is the first recognition which has been indicated; but he applies it only to the races of man, and to certain characters alone. After remarking that negroes and mulattoes enjoy an immunity from certain tropical



diseases, he observes, firstly, that all animals tend to vary in some degree, and, secondly, that agriculturists improve their domesticated animals by selection; and then, he adds, but what is done in this latter case “by art, seems to be done with equal efficacy, though more slowly, by nature, in the formation of varieties of mankind, fitted for the country which they inhabit. Of the accidental varieties of man, which would occur among the first few and scattered inhabitants of the middle regions of Africa, some one would be better fitted than others to bear the diseases of the country. This race would consequently multiply, while the others would decrease; not only from their inability to sustain the attacks of disease, but from their incapacity of contending with their more vigorous neighbours. The colour of this vigorous race I take for granted, from what has been already said, would be dark. But the same disposition to form varieties still existing, a darker and a darker race would in the course of time occur: and as the darkest would be the best fitted for the climate, this would at length become the most prevalent, if not the only race, in the particular country in which it had originated.” He then extends these same views to the white inhabitants of colder climates. I am indebted to Mr. Rowley, of the United States, for having called my attention, through Mr. Brace, to the above passage of Dr. Wells’ work.

The Hon. and Rev. W. Herbert, afterward Dean of Manchester, in the fourth volume of the *Horticultural Transactions*, 1822, and in his work on the *Amaryllidaceae* (1837, pages 19, 339), declares that “horticultural experiments have established, beyond the possibility of refutation, that botanical species are only a higher and more permanent class of varieties.” He extends the same view to animals. The dean believes that single species of each genus were created in an originally highly plastic condition, and that these have produced, chiefly by inter-crossing, but likewise by variation, all our existing species.

In 1826 Professor Grant, in the concluding paragraph in his well-known paper (*Edinburgh Philosophical Journal*, vol. XIV, page 283) on the *Spongilla*, clearly declares his belief that species are descended from other species, and that they become improved in the course of modification. This same view was given in his *Fifty-fifth Lecture*, published in the *Lancet* in 1834.



In 1831 Mr. Patrick Matthew published his work on *Naval Timber and Arboriculture*, in which he gives precisely the same view on the origin of species as that (presently to be alluded to) propounded by Mr. Wallace and myself in the *Linnean Journal*, and as that enlarged in the present volume. Unfortunately the view was given by Mr. Matthew very briefly in scattered passages in an appendix to a work on a different subject, so that it remained unnoticed until Mr. Matthew himself drew attention to it in the *Gardeners' Chronicle*, on April 7, 1860. The differences of Mr. Matthew's views from mine are not of much importance: he seems to consider that the world was nearly depopulated at successive periods, and then restocked; and he gives as an alternative, that new forms may be generated "without the presence of any mold or germ of former aggregates." I am not sure that I understand some passages; but it seems that he attributes much influence to the direct action of the conditions of life. He clearly saw, however, the full force of the principle of natural selection.

The celebrated geologist and naturalist, Von Buch, in his excellent *Description Physique des Isles Canaries* (1836, page 147), clearly expresses his belief that varieties slowly become changed into permanent species, which are no longer capable of intercrossing.

Rafinesque, in his "New Flora of North America", published in 1836, wrote (page 6) as follows: "All species might have been varieties once, and many varieties are gradually becoming species by assuming constant and peculiar characters;" but further on (page 18) he adds, "except the original types or ancestors of the genus."

In 1843-44 Professor Haldeman (*Boston Journal of Nat. Hist. U. States*, vol. iv, page 468) has ably given the arguments for and against the hypothesis of the development and modification of species: he seems to lean toward the side of change.

The *Vestiges of Creation* appeared in 1844. In the tenth and much improved edition (1853) the anonymous author says (page 155): "The proposition determined on after much consideration is, that the several series of animated beings, from the simplest and oldest up to the highest and most recent, are, under the providence of God, the results, FIRST, of an impulse which has



been imparted to the forms of life, advancing them, in definite times, by generation, through grades of organisation terminating in the highest dicotyledons and vertebrata, these grades being few in number, and generally marked by intervals of organic character, which we find to be a practical difficulty in ascertaining affinities; SECOND, of another impulse connected with the vital forces, tending, in the course of generations, to modify organic structures in accordance with external circumstances, as food, the nature of the habitat, and the meteoric agencies, these being the 'adaptations' of the natural theologian." The author apparently believes that organisation progresses by sudden leaps, but that the effects produced by the conditions of life are gradual. He argues with much force on general grounds that species are not immutable productions. But I cannot see how the two supposed "impulses" account in a scientific sense for the numerous and beautiful coadaptations which we see throughout nature; I cannot see that we thus gain any insight how, for instance, a woodpecker has become adapted to its peculiar habits of life. The work, from its powerful and brilliant style, though displaying in the early editions little accurate knowledge and a great want of scientific caution, immediately had a very wide circulation. In my opinion it has done excellent service in this country in calling attention to the subject, in removing prejudice, and in thus preparing the ground for the reception of analogous views.

In 1846 the veteran geologist M.J. d'Omalius d'Hallo published in an excellent though short paper (*Bulletins de l'Acad. Roy. Bruxelles*, tom. xiii, page 581) his opinion that it is more probable that new species have been produced by descent with modification than that they have been separately created: the author first promulgated this opinion in 1831.

Professor Owen, in 1849 (*Nature of Limbs*, page 86), wrote as follows: "The archetypal idea was manifested in the flesh under diverse such modifications, upon this planet, long prior to the existence of those animal species that actually exemplify it. To what natural laws or secondary causes the orderly succession and progression of such organic phenomena may have been committed, we, as yet, are ignorant." In his address to the British Association, in 1858, he speaks of "the axiom of the continuous operation of creative power, or of the ordained