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Introduction by Christine Chua and John van Wyhe:

Although this review which criticised *Origin of species*, was written anonymously, it was known that Samuel Haughton was its author. Samuel Haughton (1821-1897) was a professor of geology at Dublin University, the president of the Geological Society of Dublin as well as an ordained minister of the Church of Ireland and a deeply religious man. After the publication of this review, Darwin wrote to Hooker on 30 April 1860: "Haughton has been down on us with awful force." Darwin wrote a referee report on Haughton's manuscript in 1878. (<http://darwin-online.org.uk/content/record?itemID=RoySoc-RR8.107>)

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### Biogenesis

The active and restless mind of man has never been content with the knowledge of the present, but has always sought to know the future and the past. The guesses of the Ancients as to the future of man are among the most interesting, and, at the same time, the most puerile of their philosophical speculations. The reader of the *Tusculan Disputations* rises from his task, charmed by the style of the writer, but thankful that a certain revelation of the future renders him immeasurably superior in knowledge to the weavers of these pleasant webs of fiction, and though he admire the skill of the ingenious sophists who live again and dispute in the pages of Cicero, he would not for an instant exchange his own position for theirs.

The Moderns have resolved, by their speculations on the past, to show that in ingenuity and oddness of conceit, and, probably, also in wideness from the truth, they are in no respect inferior to the Ancients. The future being shut out from us, we are resolved to try what we can effect, in proof of our versatility of imagination, by guessing at the history of the past. To establish a character for subtlety and skill, in drawing large conclusions on this subject from slender premises, the first requisite is, ignorance of what other speculators have attempted before us in the same field; and the second is, a firm confidence in our own special theory. Neither of these requisites can be considered wanting in those who are engaged in the task of reproducing Lamarck's theory of organic life, either as altogether new, Or with but a tattered and threadbare cloak, thrown over its original nakedness.

The sciences of Geology and Political Economy are mainly answerable for the revival of these exploded and forgotten fancies:—Geology, in supplying the lost history of organic life, which could never be studied profoundly from the creatures living at any given time; and

Political Economy, in furnishing, from its mean and sordid motives, a Malthusian force, supposed to be sufficient to supply the wants of previous theories.

One of the earliest speculators on the origin of the diversified forms of life we see around us, and class as varieties, species, and genera, was Buffon, who published in 1766\* his theory of the derivation of all mammal forms by degradation, from fifteen primary and perfect types, and nine special or isolated species.

This theory of Biogenesis by degradation, although now superseded by the theory of progression, has much to be said in its favour, and derives additional importance from the facts of the history of life made known since Buffon's time, by the science of Geology; the princi

\*"Histoire Naturelle," tom. xiv.

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pal of these additional facts are, the degradation of fishes from their first introduction in the Old Red Sandstone period to the present day; the corresponding degradation of the Cephalopods, and, though in a somewhat less degree, of the Reptiles.

The following are the original types of Buffon, from which all mammals are derived by degradation:—

- I. The solid-hoofed type.  
Ex. The Horse.
- II. Large cloven-footed type, with hollow horns.  
Ex. The Ox.
- III. Small cloven-footed type, with hollow horns.  
Ex. The Sheep.
- IV. Cloven-footed type, with solid horns.  
Ex. The Stag.
- V. Doubtful cloven-footed type.  
Ex. The Pig.
- VI. Divided-footed type, carnivorous, with retractile claws.  
Ex. The Cat.
- VII. Divided-footed type, carnivorous, with non-retractile claws. Ex. The Dog.
- VIII. Divided-footed type, carnivorous, with non-retractile claws, and a pouch under the tail.  
Ex. The Hyaena.
- IX. Divided-footed type, carnivorous, with long bodies: five fingers on each foot, and the thumb separated from the other fingers.  
Ex. The Martin.

- X. Divided-footed type, with two large incisor teeth, and no bristles on the body.  
Ex. The Hare.
- XI. Divided-footed type, covered with bristles  
Ex. The Porcupine.
- XII. Divided-footed type, covered with scales.  
Ex. The Pangolin.
- XIII. Divided-footed type, amphibious.  
Ex. The Seal.
- XIV. Quadrumana.  
Ex. The Monkey.
- XV. Divided-footed type, winged.  
Ex. The Bat.

In addition to these, Buffon considered there were nine irreducible species, some of which, according to more recent views, are immediately

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connected with the preceding, and are even typical examples of them.

His nine isolated species are—

- I. The Elephant.
- II. The Rhinoceros.
- III. The Hippopotamus.
- IV. The Giraffe.
- V. The Camel.
- VI. The Lion.
- VII. The Tiger.
- VIII. The Bear.
- IX. The Mole.

Some of the classes given by Buffon are as old as the time of Moses, who defines with accuracy the class Ruminantia, distinguishing it from the Pachydermata and Rodentia, in his classification of “clean” and “unclean” beasts.”

Whatever may be thought by the more enlightened moderns of the merits of this classification of mammals, Buffon certainly agrees with them in one respect: he takes the non-reality of species as the starting point of his theory, and, by a continued degradation downwards, develops all the varieties of life we see on the surface of the globe.

To those who love to dwell upon the past, this theory of degradation will afford solace and consolation in the troubles of the present, as they can reflect upon how good and excellent their ancestors were, and congratulate each other upon their superiority to those that will come after them. Every system of philosophy provides its followers with a “solatium doloris;”

the degradationists find it in the contemplation of the past, and the progressionists in the prospect of the future; to those who are contented with the present, and deny our knowledge of the past or future, both theories appear as the idle dreams of childhood, the awakening from which will disclose a reality totally different from the troubled fancies of the night. Lamarck is the father of the progressionists, and of the many who quote his name as an authority in support of their systems, or express their disapproval of his doctrine, few have taken the trouble to understand his theory or trace it to its origin.

It is apparently founded on the confusion of species, like that of Buffon, but there is in reality an *arrière pensée*, like an unseen presence, which corrupts his reasoning and discloses the motive force of his entire system. This hidden spring of action and theorizing is a profound, and, as many think, a well-founded contempt for humanity, which pervades his writings as thoroughly as it does the "Voyage to the Houyhnhnms." Lamarck was too quick witted and acute an observer, however deficient he may have been as a reasoner, to have believed his own theory, the real mainspring of which

\*Leviticus, xi. 2-8.

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is the desire to degrade man into an intelligent baboon, or yahoo; what difference is there in a name! In his desire to do so, he overlooks every fact at variance with his foregone conclusion, and writes of mankind with a virulence which, though devoid of the wit of Swift, springs from the same profound and unalterable conviction of the worthlessness of the creature he describes:—

"Si Newton, Bacon, Montesquieu, Voltaire, et tant d'autres hommes ont honoré l'espèce humaine par l'étendue de leur intelligence et de leur génie; combien ne la rapprochent pas de l'animal cette quantité d'hommes bruts, ignorans, en proie aux préjugés les plus absurdes, et constamment asservis par leurs habitudes, qui cependant composent la masse principale chez toutes les nations?"

Lamarck's contempt for his species is again shown in the strange list of resemblances he selects for his comparison between man and the chimpanzee, a comparison fully as degrading as Swift's mock imitation of a naturalist's description of a yahoo.

Lamarck's theory consists in the assertion of the following Laws, six in number, which he dignifies with the title of Laws of Nature:—

- I. Law of Specialization of Function, by which a function at first general, or belonging to the whole body, is determined to a particular organ
- II. Law of Nutrition producing Death, by the forced inequality between the materials fixed by assimilation, and removed by excretion. This law is intended to account for death, which is a puzzle to the naturalists.

- III. Law of Movement of Complex Fluids in Canals. —This law I profess my inability to understand: in the statement of it, Lamarck, who, like most naturalists, was unacquainted with Physics, and untrained in the severe discipline of mathematical reasoning, attributes properties to fluids in motion, which must be considered by lookers-on as little short of miraculous.
- IV. Law of Change of Composition of Fluids in Circulation.—This law is as obscure, and as miraculous in its results, as the preceding. Natural religion, however, would appear to consider herself entitled to her miracles as well as revealed religion.
- V. Organic Forms acquired under the presiding influence of external circumstances are transmitted by Generation.—This law involves the famous Law of Natural Selection, attributed within the last few months to Mr. Darwin.
- VI. By the concurrence of the preceding Laws, of a long lapse of time, and an almost inconceivable diversity of surrounding circumstances, all Species have been formed in succession.—Lamarck's theory is essentially one of Progression, and is totally opposed to that of Buffon, which is one of Degradation; yet it is remarkable that they both rest upon the same

\*"Recherches sur l'Organization des Corps Vivans," p.127. Paris, Floreal. An. X.

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foundation—the assumed non-reality of species. Like his successors in the Progression Theory, Lamarck spent his life in the establishment of the reality of species, and it is a humiliating reflection that, at the close of it, he believed himself to have lived under a delusion. Let us hear his confession:—

"J'ai long temps pensé qu'il y avait des Especes constantes dans la nature, et qu'elles étoient constituées parles individus qui appartiennent à chacune d'elles. Maintenant je suis convaincu que j'etois dans l'erreur à cet égard, et qu'il n'y a réellement dans la nature que des in dividus."

What must we think of the principles that guide the speculations of Naturalists, when we find minds like those of Buffon and Lamarck drawing opposite conclusions from the same premises? It matters little in this question whether the premises be true or false, whether species be truly distinct or not; our surprise at the logic of the Naturalists is natural, and must border on a courteous contempt.

The English revival of Lamarckianism, or "Progress in Organic Life," by Mr. Darwin, involves no idea in advance of those contained in Lamarck's six laws, but gives a greater prominence to the Law of Continuation of Peculiarities by Generation, by the assertion that such peculiarities, and such only, as are useful to the creature, in its struggle for existence, will become hereditary; the reason being, that animals provided with such peculiarity will have

the advantage in the battle of life over their fellows in the competition for food, females, and other necessities for the preservation of the individual and species. This notable argument is borrowed from Malthus' doctrine of Population, and will, no doubt, find acceptance with those Political Economists and Pseudo-Philosophers who reduce all the laws of action and human thought habitually to the lowest and most sordid motives.

It is dignified with the title of a Law of Nature, called the Law of Natural Selection, and forms the only bond fide addition made by Darwin to Lamarck's famous Theory of Progression; in which, however, it is implicitly involved.

I make no account of Mr. Darwin's geological additions to Lamarck, for two reasons. In the first place, the laws of geographical distribution explained by geological change are not ad rem, and were previously fully treated of by Buffon and Forbes; and in the second place, Mr. Darwin admits that the facts of Geology are opposed to his (Lamarck's) theory, and they are pleasantly alluded to as the Geological Difficulty! So far as the history of life on the globe indicates a progression, Lamarck is entitled to the benefit of it, as in the case of Mammals and Plants; but certainly not to the exclusion of the facts in favour of degradation,—such as the case of Fishes, Reptiles, and Cephalopods, which must be credited to the account of Buffon and his followers. Lamarck says distinctly:—"Ce ne sont pas les organes, c'est à dire, la nature et la forme des parties du corps d'un animal, qui ont donné lieu A ses habitudes et à ses facultés particulières; mais ce sont au contraire ses habitudes, sa manière de vivre, et les circonstances dans lesquelles se sont rencontrés les individus don't il provient, qui ont avec le

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temps constitué la forme de son corps, le nombre et l'état de ses organes, enfin les facultés dontil jouit."

This statement implies all that is essential in Mr. Darwin's Law of Natural Selection, which, by its prominence, fills in his system the place occupied by the Law of Imitation in the original theory of Lamarck. This difference arises from the difference of the points of view of the Frenchman and the Englishman,—a difference characteristic of the two races. The Frenchman, with the vivacity and perception of the ridiculous belonging to his nation, seizes upon the quality most likely to elevate a monkey into a man, selects the faculty of Imitation, and, with a bitter satire, endows his monkey with the human desire to better his condition, and lift himself above his brother chatterers. He thus magnifies the monkey power of imitation,—which is truly wonderful, and extends to the most extraordinary actions,—into the position of a Law of Nature, sufficient to create man! The Englishman, on the other hand, firmly believes his theory, and, with a confident faith in the power of food and comfort, equally characteristic of his country, elevates the desire to supply the stomach into a law of sufficient force to convert an eel into an elephant, or an oyster into an orang-outan.

Other theorists, whose name is Legion, have printed their crude fancies, and have met with numerous readers among the young and in experienced,—the sciolists of science. It is not to be supposed that a public which accepted Mesmerism and Table-turning could judge with accuracy of the pretensions of loose and ill-reasoned speculations on the origin of Life. It has rained, hailed, and poured theories of life, religious, philosophical, and pseudo-scientific,—with a marvellous rapidity, within the last few years. Some theorists have started from the Nebular Hypothesis of Laplace; others have speculated on the results of super foetation; and others on the brilliant and seductive theory of the correlation of Physical forces; but they may all be classed as, knowingly or not, the followers of Lamarck. Some have taught that all the planets, being composed of the same mineral constituents as the earth, must produce in succession the same organic phenomena, and weary the reader with the idea of the same pterodactyles and cetacea, the same monads and men, appearing on all the globes that circle round the sun. Others have called to mind the loss of heat of our planet, and, by the correlation of forces, have reproduced it in the increasing intelligence of the successive forms of life that have peopled our globe. In a word, there is no folly that human fancy can devise, when truth has ceased to be of primary importance, and right reason and sound logic have been discarded, that has not been produced, and preached as a new revelation. Neither have the disciples of Lamarck wanted the martyr spirit supposed to be essential to the apostles of a new faith. They have courted persecution, and reviled their opponents with bitter words, and with such weapons as are permitted by the free civilization under which we live. They argue, with a logic worthy of their system, that because truth has been often in a minority, therefore minorities and theories in a minority must necessarily be true.

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It is curious to observe the natural instinct by which Lamarck and his followers appeal from the judgment of their peers to the young, the enthusiastic, and the inexperienced. I shall quote but two instances of this necessary instinct of self-preservation:—

“Que de réflexions ces considerations pourrout faire naitre dans l'esprit du petit nombre de ceux qui en sont susceptibles et qui sont lents à prononcer! les autres auront bientôt fait à cet égard: ils trancheront sans examen, et décideront d'après ce qu'il leur conviendra le mieux, d'après la portée de leurs conceptions.”—Lamarck, p. 123.

“I by no means expect to convince experienced naturalists, whose minds are stocked with a multitude of facts, all viewed, during a long course of years, from a point of view directly opposite to mine – but I look with confidence to the future, to young and rising naturalists, who will be able to view both sides of the question with impartiality.”

—Darwin's Origin of Species, pp. 481–82.

The theories of Boyéveats, already described, and many others, are based upon the following three unwarrantable assumptions, the denial of which, until proved, brings to the ground the entire structure, like a child's house of cards—

- I. The indefinite variation of species continuously in the one direction.
- II. That the causes of variation assigned, viz., cross-breeding (Buffon); imitation (Lamarck); and natural advantage in the struggle for existence (Darwin), are sufficient to account for the effects asserted to be produced.
- III. That succession implies causation.

On each of these a few words of explanation are necessary.

I. The indefinite variation of species continuously in the one direction.

This has been expressed by some Lamarckians as a state of unstable equilibrium of nature; but, should we assume the existence of a law, which is contrary to all we know of every other department of nature? If we must have a mechanical analogy to fix our ideas, nature might be better compared to a condition of dynamic equilibrium, in which all the parts are in motion, and never return to precisely the same relative positions, but, nevertheless, continually balance round certain definite positions of equilibrium, which never change. What should we think of the astronomer, who from a few years' observation of the precession of the equinoxes, should predict that in due time the north pole of the earth's axis would point to the same position among the stars that the south pole now occupies. Yet this very species of assumption is made by Lamarck and Darwin, in their appeal to the supposed influence of a long lapse of time. Yet, in the writings of the latter progressionist there is this singular inconsistency, that while he shows the utmost effects of human breeding on domestic animals to be capable of production in ten or twenty years; he denies the right of his adversaries to appeal to the unaltered condition of the ass, the ostrich, or the cat, for 3000 years, as a proof that specific forms balance round central types, and have no tendency to depart indefinitely from them.

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Is it rational to suppose that Man can alter the head and neck of a pigeon into any desired form in six years, and that Nature, with her later skill cannot in 3000 years lengthen the ostrich's wings by a single inch, although, according to the theory, it is her evident wish to do so.

II. The Causes of Variation assigned are not adequate to produce the effects ascribed to them.—The discussion of the inadequacy of the causes assigned would lead to a treatise longer than that of Buffon, Lamarck, or Darwin—and I must therefore content myself with an example. The humblebee and the hive bee coexist together, and the latter is supposed to be



developed from the former by the law of natural selection, breeding, in succession, bees possessed of the talent of economizing more and more of wax in the construction of their cells. Mr. Darwin appears to be very imperfectly acquainted with the real economy of wax that has occurred in the passage, and I shall endeavour to supply the deficiencies of his theory, and, perhaps, add a great fact to the stock of the progressionists.

1. The humble bee constructs single cells, and uses 100 units of Wax.
2. A bee (not known to science, but, doubtless, extinct) was grown, that made cells in the form of equilateral triangles placed in double combs, with flat bottoms to the cells. This bee used only 50 units of Wax.
3. A bee (also extinct) was grown, that built square cells in double combs. This bee used only 413 units of wax.
4. A bee (also extinct) was grown, forming hexagonal cells, with flat bottoms, in double combs. This bee used  $33 \frac{2}{3}$  units of wax.
5. The hive bee (now living side by side with his humble progenitor) was produced by natural selection, dependent on the economy of wax, arising from the contrivance of substituting for the flat bottoms of the hexagonal cells the trihedral angles and planes of the rhombic dodecahedron. This bee (our bee) uses 323 units of wax.
6. The Bee of the Future (not yet produced), which shall have learned how to construct the cells described by the mathematician Lluillier. This bee will be broader and shorter than the present, the breadth and length admitting of prediction to any degree of approximation.

This Bee of the Future will only require  $24 \frac{1}{2}$  units of wax 1–Vivat Geometria!

Of these six species of bee (the first and the fifth are living), No. 5 using only 323 lbs. of wax in the construction of its cells for every 100 lbs. used by No. 1. According to the Malthusian law, No. 5 has exterminated No.4, by virtue of the trifling advantage of 3rds of a pound of wax in every 100 lbs.; and this slight advantage is gravely alleged as the efficient cause of converting one species of bee into another! This would be all very well, if No.1, the spendthrift humble bee, were not still living, and holding his ground well against his enemies, to bear witness against this silly theory.

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In fact, the whole question of the economy of wax, and other such questions, require a thorough sifting. To my mind, it is evident that economy of wax has nothing whatever to do with the making of the bee's cells; but that this and other properties, such as maximum resistance to fluid pressure, &c., necessarily reside in the bee's cell, because they are the inherent properties of the rhombic dodecahedron, which is the form affected by that cell. The

true cause of that shape is the crowding together of the bees at work, jostling and elbowing each other, as was first shown by Buffon. From this crowding together, they cannot help making cells with the dihedral angles of  $120^\circ$  of the rhombic dodecahedron; and the economy of wax has nothing to do with the origin of the cell, but is a geometrical property of the figure named.

III. The most serious logical blunder committed by all who invent a theory of life from the geological succession is, that Succession implies Causation. It is argued that the Palaeozoic cephalopoda produced, in some way or other, the Red Sandstone fishes; that these in turn gave birth to the Liassic reptiles; that the non-placental mammals of the upper Oolite grew after some fashion, and ultimately produced the Tertiary mammals, some of which, in an unhappy hour, gave birth to man. The only fact at the basis of this astonishing inverted cone of reasoning is that these creatures did succeed each other in the manner described, and from this it follows, *post hoc ergo propter hoc*, that they succeeded each other in the way of cause and effect. I propose to test this strange theory by a corresponding theory of the mineralogical succession of igneous rocks, which opens up a fertile field of speculation, hitherto unwrought. The igneous rocks of the Palaeozoic period contain abundance of felspar, whose principal constituent is potash; the Mesozoic igneous rocks abound in soda, replacing potash; and in the tertiary period, soda itself gives way to lime and magnesia. Viewed in the light of the Lamarckian philosophy, here is a distinct indication that soda and lime are only allotropic conditions of potash. We may read the history of their formation in the crust of the globe, if we will only open our eyes and see it written. I may add, by the way, that this theory of the origin of lime is more intelligible than that of many geologists, who would attribute the greater accumulations of calcareous rocks in secondary and tertiary strata to the creation of lime by organic force.

If any chemist or mineralogist were to put forward such a geological theory of the origin of soda and lime as the foregoing, he would be regarded as a lunatic by other chemists and mineralogists. How does it happen that a theory of the origin of species, which rests on the same basis, is accepted by multitudes of naturalists, as if it were a new Gospel? I believe it is because our naturalists, as a class, are untrained in the use of the logical faculties which they may be charitably supposed to possess in common with other men. No progress in natural science is possible as long as men will take their rude guesses at truth for facts, and substitute the fancies of their imagination for the sober rules of reasoning.

It has been well observed by the greatest of living Palaeontologists,

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“that past experience of the chance aims of human fancy, unchecked and unguided by observed facts, shows how widely they have ever glanced away from the gold centre of truth!”