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Contributors

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Royal College of Surgeons of England

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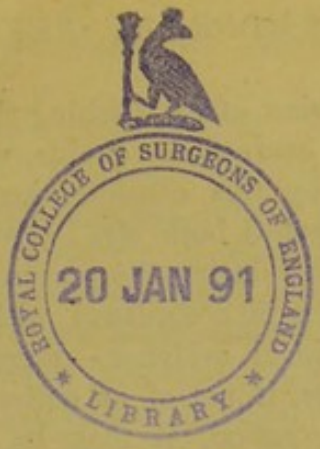

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THE GOSPEL OF EVOLUTION.

May. 1880.

ON the first day of October, 1859, Mr. Darwin marked an epoch in biological science by the publication of his "Origin of Species by means of Natural Selection;" and on the 9th of last month, at the Royal Institution, before a crowded and distinguished assemblage, Mr. Huxley delivered an eloquent address, in celebration of the "Coming of Age" of this work, and of the principles which it enunciates.

Of Mr. Darwin as a naturalist it would be almost a presumption, in any one less gifted or less eminent than Mr. Huxley, to speak. His brilliant genius, and the almost boundless stores of his knowledge in all departments of animated nature,—his candid and philosophic spirit, and his evident and constant preference of truth to theory,—all these are known and appreciated wherever science has been heard of throughout the civilized world.

Mr. Huxley himself is an accomplished biologist, a distinguished and successful teacher, a fascinating writer and speaker, and, to sum up all in one word, a philosopher, and one who takes large and comprehensive views of every subject that comes under his notice. Therefore, Darwin expounded and illustrated by Huxley is a most formidable combination, and one that might well quench the ardour and damp the courage of any one who wished merely to cavil. Such is, such has ever been, far from my intention. It is true that ever since the first appearance of the work in question I have been a doubter. To my mind the evidence for the theory has ever appeared utterly inadequate, strained, and even contradictory; and the theory itself has seemed to be founded upon, and supported by, suppositions that are directly opposed to all that we *know* with any certainty as to the continuance of species.

Speaking on the subject of scientific beliefs, Mr. Huxley says, that "by doubt they are established, and open inquiry is their bosom

friend."* Therefore, in the view of establishing the truth, I have on many occasions ventured to express my doubts, with the reasons for them; further encouraged by this consideration,—that as on some important and even cardinal points both Mr. Darwin and Mr. Huxley have on more than one occasion during the past twenty years materially modified their views,—doubtless in accordance with what appeared to them to be satisfactory additional evidence,—there may possibly be a prospect of still further change, if not of an entire abandonment of the position. As a passing illustration, it may be mentioned that Mr. Darwin not unfrequently said it would be fatal to his theory if it were found that any organs existed which could not have been evolved by minute selective modifications, in accordance with his theory;† and some time afterwards, in his "Descent of Man,"‡ he writes thus:—

"No doubt man, as well as every other animal, presents structures which, as far as we can judge with our little knowledge, are not now of any service to him, nor have been so during any former part of his existence. Such structures *cannot be accounted for by any form of selection*, or by the inherited effects of the use and disuse of parts."

This quotation is made without any intention of "Hansardising," or even of "collating texts,"§ but merely to justify the belief that as there is evidently room, within the limits of the theory, for great latitude and variety of opinion, it may be possible that shades of opinion extending even outside those limits may be to some extent defensible.

The *general* doctrine of Evolution teaches that all organic forms, both vegetable and animal, and including man himself, are lineally descended from a few ("four or five") simple exceedingly generalised forms, or most likely, "by analogy,"‖ from *one* form only, by a process of differentiation by the accumulation of numerous, successive, minute variations. The *special* form of Evolution known as the "Darwinian Theory" tells us, not exactly how these variations were primarily caused, but how their accumulation and fixation were determined, so as to favour the necessary divergences from generalisation to specialisation to form species, genera, orders, &c.

It shews us that families and species of animals tend to increase in a high geometrical ratio; that this increase is checked by destructive agencies of various kinds; and that hence arises a constant "struggle for existence," in which the "weaker go to the wall," and those that are stronger, called, in the language of the theory, the "favoured races," survive. These are supposed to be so "favoured," in virtue of having come into existence (in obedience to some chance, or law, the conditions and causes of which are entirely unknown) with some portion of their organisation in so far superior to, or different from, that of their brethren, as to give them some small advantage in the struggle, and to enable

* "Lay Sermons," &c., p. 279.
† Compare "Origin of Species" p. 189.
‡ Vol. ii. p. 387.
§ See Professor Huxley's "American Addresses," p. 148.
‖ "Origin of Species" p. 424, 5th Edition.

them to survive whilst the others die. This is what is termed "Natural Selection" and the "Survival of the Fittest."

When such a favourable variation as this occurs, it is supposed to be transmitted to the posterity of these survivors, so forming a race a little more adapted to permanency than the original one; and by the gradual accumulation and augmentation of these advantages, for perhaps thousands or millions of generations, a *new* species is supposed to be originated. A similar process carried on in a fresh direction of variability is attended by similar results, and so various groups are formed, with ever-varying amounts of divergence from the original stock; such groups arranging themselves, or being artificially arranged, into species, genera, orders, &c., according to the nearness or distance of their relationship. So that all organic beings are blood relations, only differing in propinquity. They have all sprung from common ancestry, and are, therefore, essentially and fundamentally of *one nature*. And all this has occurred without the "intrusion" (as it is called by Mr. Huxley) of any but secondary causes—that is, without the intrusion of a Creator.

The later Darwinism—much more advanced than Mr. Darwin himself—is far more comprehensive in scope than this. It is called, on the Continent, *Haeckelism*, because, although the doctrines are said to be derived essentially from those of Mr. Darwin, they are, under the exposition of Haeckel and his school, metamorphosed into something indefinitely more violent and uncompromising. Mr. Darwin gives no opinion upon the origin of life itself; Haeckel unhesitatingly *affirms* its origin by natural law from inorganic matter—without, it may be added, offering any vestige of proof, or even argument in favour of such a position. Mr. Darwin implies and admits the idea of *Creation*; Haeckel considers such a theory almost too contemptible to mention, and avowedly recognizes only *one* force in the universe—the Mechanical. This force presides equally over the motions of the planets, the formation of living matter, and the evolution of what we, in our ignorance, have been accustomed to call the reason, soul, and conscience of man.

To Haeckel the most complicated organic phenomena or functions present no more difficulty than any ordinary mechanical interaction. The origin and development of the organs of sense are as comprehensible to him as earthquakes, winds, or tides.* All bodies with which we are acquainted are "equally living,"—the opposition that has been held as existing between living and dead matter has no existence. The fall of a stone to the earth, or the formation of a crystal, are "neither more nor less manifestations of life than the growth and flowering of plants, the propagation and sensory faculties of animals, or the perceptions and ideas of man." † The "monistic" philosophy alone is competent to explain every natural phenomenon. Everything is originated and accomplished by mechanical causes alone, and not in accordance with any intelligent purpose—by "*causæ efficientes*," not by "*causæ finales*."

* "Natürliche Schöpfungsgeschichte," p. 21. † *Ibid.*

"*There is no such thing as* FREE WILL. In the light of the Monistic Philosophy those phenomena which we have been accustomed to consider the most free and most independent, the manifestations of the human will, are subject to laws exactly as rigid as those of any other phenomena in Nature. . . . . Everywhere in Nature is Spirit; and out of Nature we know of no Spirit. Man stands *in* Nature, not *above* it. . . . . Soul and Spirit are only differentiated functions of that which we indicate by the expression *Force*, and force is a universal attribute of matter. . . . . The magnet that attracts iron filings, the powder that explodes, the steam that propels the locomotive, are all living bodies; they act by living force, exactly as does the sensitive mimosa, which folds up when its leaves are touched; as does the venerable (*ehrwurdige*) *Amphioxus*, which buries itself in the sand; as does the man, who thinks."*

I offer no apology for this somewhat long and tedious sketch of the doctrines zealously promulgated by the leader of modern biological "progress" in Germany, who has also a very large following in our own country. It is well to know, from time to time, exactly *where we are*, what we are called upon to believe, under penalty of forfeiting all claim to enlightenment, or even common understanding, and against what we have to enter our protest, if we do not acquiesce. A belief in some such doctrines as these is now obligatory. They were, up to a recent period, on their trial, and were expected to produce evidence of character, like any other scientific doctrine.

The case is now altered. Mr. Huxley has pronounced, *ex cathedrâ*, that Evolution is no longer a hypothesis, but "A FACT." The question is not, Has it occurred? but How has it occurred? And any denial of it "is not worth serious consideration."† Woe to those who venture to dissent! Haeckel divides mankind into two classes, the thoughtful and the thoughtless; and defines the former to be those who believe in his doctrines, and the latter those who do not.‡ The learned and modest Dr. Büchner calls us "mental slaves," "speculative idiots," and "yelping curs," and announces his own "enlightenment and the forthcoming deliverance of his fellow-men from obsolete and pernicious prejudices."§ Mr. Huxley himself, in more stately language, pronounces his critics to be "persons who not only have not attempted to go through the discipline necessary to enable them to be judges, but who have not even reached that stage of emergence from ignorance in which the knowledge that such a discipline is necessary dawns upon the mind."‖ *Jam satis est,*—DIXI!

Well, let the confession cost what it may; and whatever amount of

* "Anthropogenie," chap. xxvi. pp. 707–8 † *Op. cit.*, p. 150.

‡ "Natürliche Schöpfungsgeschichte," p. 577. To the opinion already quoted, Professor Haeckel adds that all who do not believe in his version of the doctrine of Evolution are "for the most part" either ignorant or superannuated—see p. 638 of the same work. In support of this string of wild statements, no vestige of proof or demonstration of any kind is offered, unless constant and monotonous reiteration be supposed to constitute proof.

§ "Force and Matter," Pref. p. 86. ‖ *Op. cit.*, p. 148.

ignorance it may imply, it must be made. Some of us to whom these reproofs are addressed, are believing exactly what Mr. Huxley himself believed a very few years ago; that is, we are prepared to accept the doctrine of Evolution *subject to this reserve*, that proof shall be given that physiological species can be produced by selective crossing. If we cannot change our belief quite so rapidly as he can, it may perhaps be that the rules and conditions so judiciously laid down by himself have not been fulfilled to our satisfaction; and that we decline to accept a proof of something entirely different, in place of that which has been asked for. My own mental attitude in reference to this question is accurately set forth by Mr. Huxley himself in his "American Addresses." At p. 21 he thus expresses himself:—

"Now we have to test that hypothesis. For my part, I have no prejudice one way or the other. If there is *evidence* in favour of this view, I am burdened by no theoretical difficulties in the way of accepting it; *but there must be evidence.* Scientific men get an awkward habit—no, I won't call it that, for it is a valuable habit—of believing nothing unless there is evidence for it; and they have a way of looking upon belief which is not based upon evidence, not only as *illogical*, but as *immoral*."

I am content, in any such inquiry as this, to accept the rules of investigation so well laid down by Mr. Huxley. At one time he himself had this *awkward* or *valuable* habit of requiring evidence; and he showed, not only that *evidence* was absolutely essential, but indicated plainly *what kind* of evidence we must demand, before accepting any theory of development. "Is it satisfactorily proved, he asks"* "that species may be originated by selection? that there is such a thing as selection? that none of the phemomena exhibited by species are inconsistent with the origin of species in this way"? *At that time,* in accordance with the evidence then offered, he returned a negative verdict—viz., that the *proof* was still wanting of any such origin of species; and that, "as the case stands at present, this 'little rift within the lute' is neither to be disguised nor overlooked."† This was written in 1860, shortly after the appearance of Mr. Darwin's work.

Two years later,‡ Mr. Huxley, speaking of "progressive modification" as applied to the origin of species, says, that "should such an hypothesis eventually be proved to be true, *in the only way in which it can be demonstrated*—viz., by *observation and experiment upon the existing forms of life,* the conclusion will inevitably present itself," &c. On the general question he thus expresses himself, in the same discourse:—

"Obviously, if the earliest fossiliferous rocks now known are coëval with the commencement of life, and if their contents give us any just conception of the nature and the extent of the earliest fauna and flora, the *insignificant amount of modification* which can be demonstrated to have taken place in any one group of animals or plants, is *quite incompatible* with the hypothesis that all living forms are the results of a necessary process of progressive development, entirely comprised within the time represented by the fossiliferous rocks."

This carefully considered and weighty judgment was republished in

* "Lay Sermons," &c., p. 294. † *Ibid.*

‡ Anniversary Address to the Geological Society, 1862. "Lay Sermons," p. 226.

1874,—only six years ago,—without, I believe, any indication, either in the discourse itself or in the volume including it, that any modification had taken place in any essential part of Mr. Huxley's views on the subject. This, then, or something very like it, may be assumed as representing the aspect of his mind towards the question of Evolution, not more than six years since. Doubtless, in these years, much has occurred, and many discoveries have been made. One thing, however, is certain—viz., that "observation and experiment on the existing forms of life," once recognised as the *only* test, have given as yet no evidence whatever. *Varieties*, of more or less persistence, have been formed, all having an ultimate tendency to revert to the parent form; but there has not been the faintest indication of the development by artificial selection, however carefully conducted, of a new species, the individuals of which are fertile, *inter se*, and infertile with the parent stock.

From this, however, it would be hasty and unjust to conclude anything. It is only alluded to, in passing, to show that, *in this respect*, the question remains exactly where it was twenty years ago. Under any hypothesis, *specific* variation must be an exceedingly slow process, very unlikely to be witnessed in any definite number of years, or perhaps generations. We do not wish, as asserted of us by Haeckel,* to witness on the table of the physiological laboratory the conversion of a Kangaroo into a Prosimian, of this into a Gorilla, and of the Gorilla into a Man. What we do expect, and what we must inevitably meet with, on any theory of progressive development, will appear shortly. What now has to be considered is the question whether the general evidence for the theory of Evolution has been materially strengthened; and in particular whether the discoveries of the last few years are of sufficient weight to justify Mr. Huxley in proclaiming absolutely (not to say dictatorially) that Evolution is no longer a hypothesis, but an "*historical fact*,"—that any denial of it is not worth consideration,—and in relegating those who only think as he thought a few years ago to that limbo destined to crass and hopeless ignorance.†

With regard to Mr. Darwin's own doctrines, it is almost certain that everything that can be said, either in support of, or in opposition to, them, has been exhaustively said years ago. The literature of the controversy would form a library of no small dimensions, and the arguments for and against have become almost household words. I shall, therefore, only find it necessary to indicate, in briefest outline, the two or three grounds on which I have always felt unable to accept the theory of Natural Selection. No doubt it is only what has been said before; but so long as the doctrine itself is thought worthy of formal re-affirmation, it may be permitted to those who cannot accept it to re-state the principal and hitherto unanswered objections to it.

* "Anthropogenie," pp. 362-3. To use the author's own phraseology, the allegation is made "mit mehr Hinterlist als Verstand."

† "American Addresses," &c.; The Essay on the "Study of Biology," p. 148.

The first and most obvious consideration that strikes the inquirer is this—that, with the exception of the one fact that living forms tend to increase in a geometrical ratio, there is no foundation in all the phenomena of Nature for the hypothesis. Throughout all Nature we know of no direct evidence for the occurrence of any "favourable variation." We do not even know what is, or what would constitute, a favourable variation in any given species. Mr. Darwin himself speaks of it as a useful mental exercise to try and "imagine" what would give one form "an advantage" over another; and says that, "probably in no single instance should we know what to do so as to succeed."* In the years that have passed since the promulgation of this theory, naturalists have been everywhere looking out for its practical illustrations, and have found—*not one*. It is only in imagination that favourable variations and "favoured races" exist; and yet we are in the habit of discussing them as though they had real existence, and were the familiar facts of our daily experience. It cannot be too clearly stated and understood that we know *nothing* of the occurrence, in Nature, of any variation that has succeeded, or can succeed, in giving its possessor an advantage in the supposed "struggle for life."

I say the *supposed* struggle, because, in reality, there is no such thing, in the sense here understood; or, if by "struggle" is implied any event, or combination of events, the result of which can be in any, even the slightest, degree affected by the minute individual variations here supposed. Doubtless countless myriads of living creatures come into existence, of which by far the greater part must be destroyed. One Aphis may be the parent of 5,904,900,000 individuals in five generations; and when these are swallowed up by lady-birds and other enemies in mass, it is no minute individual variation that can avert their fate. The unchecked produce of one pair of herrings would stock the Atlantic in a few years, until there was no room to move; and when these are engulfed by shoals, as a mouthful for the *Balænoptera*, they can make as little *struggle* for their existence as the grass can make that the ox licks up, or the vegetation of a district that is devastated by locusts. It is the unwritten law of Nature that one race must die that another may live; this other, in its turn, subserving the same end; and so, constantly, until the cycle be complete. Without this law, against which there is no appeal, Nature would be a chaotic impossibility. The destructive influences are so predominant, that the carnage is indiscriminate, and without struggle.

If this be so, the conclusion is inevitable. Natural Selection is merely an euphuism for a negation—a happy phrase for something that has no existence. In itself it is *nothing;* in its application to the explanation of development of structure and function, it is full of irreconcilable contradictions and incoherences. This ought to be sufficient, but there are other, and even weightier, objections. If

* "Origin of Species," 1st Edit., p. 78.

Natural Selection were a real agency, two definite consequences ought inevitably to result. In the first place, we ought to meet with frequent, if not constant, evidences of transition, so numerous and so various that "all organic beings" would be "blended together in an inextricable chaos."* And, secondly, we ought to observe a slow and gradual, but perceptible, improvement in species generally, especially marked in those whose generations succeed each other rapidly. Neither of these is observable.

With reference to the first, Mr. Darwin sees its cogency to the fullest extent, and he enters into an elaborate argument, too long to extract and too consecutive to condense, to explain *why* this "chaos" is not observed, and *why* "species came to be tolerably well-defined objects." I confess I cannot see that the case is made much clearer thereby. It is not enough to say that the reason is "because new varieties are very slowly formed, for variation is a very slow process, and natural selection can do nothing until favourable variations chance to occur."† By the terms of the hypothesis, the conditions are *always* in operation. The geometric rate of increase is always in progress; the destruction of vast numbers of individuals, and the preservation of the "more favoured" ones, are also constantly in operation; therefore, if there be any uniformity in Nature's actions, natural selection must also be constantly in operation, and its results should be observable, if not in the actual formation of new species, at least in the production of transitional varieties that were becoming gradually less fertile with the parent stock, and more fertile, *inter se*; or, in default of this, in producing a gradual improvement in the original stock. Nothing of all this occurs; the characters of families and species are absolutely constant; and no single instance is known of the kind of modified fertility here alluded to. This is inconceivable on the supposition that Natural Selection is a *vera causa*.

But even supposing it to exist at all, Natural Selection is incompetent to account for a multitude of structures and functions to which any *efficient cause* should be applicable,—notably to the earliest rudiments of useful organs. It is always insisted upon that natural selection only acts by preserving and perpetuating *very minute* variations, of such a character as will enable their possessor to contend more vigorously and successfully in the struggle for life. The idea is pretty in theory; but when we attempt its practical application, it fails utterly. Wherever we turn, we meet with structures which, by no possibility, could have been gradually and slowly accumulated on this principle.

We cannot conceive that a minute pimple on the nose could give any animal "an advantage" in the struggle for life; yet, if there be any truth in the doctrine now under discussion, such must have been the origin of the terrible weapon of the sword-fish. The fishing tackle of the *Lophius piscatorius* is equally insusceptible of explanation by this

* Mr. Darwin's own phrase:—"Origin of Species," 5th Edit., p. 407. † *Ibid.*, p. 178.

means, as its earliest rudiment must have been entirely useless. Can we conceive that a casually-enlarged cutaneous follicle can have promoted the viability of any individual or any race? Yet this must have been, on this theory, the initial condition of the characteristic organ of the mammalia. These instances might be multiplied into thousands, equally obvious, in which the earliest stages of structures must have been absolutely functionless, and therefore *useless* to its possessor. The application of the principle of conservation of *useful* variations only, is therefore impossible.

Such organs as the eye and the internal ear are quite out of reach of any explanation by Natural Selection. With regard to the former, Mr. Darwin thus expresses himself:* "To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by Natural Selection, seems, I freely confess, absurd in the highest possible degree." Yet, having said so much, he makes the attempt to explain its origin—and fails. The reason is obvious—it *cannot* be so explained; because, owing to the development of the eye being due to simultaneous growth of parts from within and from without, the organ itself would be absolutely useless until it had attained such a degree of development as to admit of these separate parts meeting; and so the principle of preserving any *useful* variety would again be quite inapplicable. The same, with modifications, may be said concerning the internal ear; but Mr. Darwin, with great judgment, makes no allusion to this subject—at least, not in any edition that I have seen.

I will not enter into any discussion of the still more serious, I may say insuperable, difficulties connected with the instincts of certain animals; such structures as the electric organ of the gymnotus; and the existence of "neuters" amongst ants and bees. I *believe* that Mr. Darwin, at the present time, attaches much less importance to Natural Selection than he did formerly; and it is a fact worthy of notice, that Mr. Huxley, in celebrating the "coming of age" of the "Origin of Species" never once alluded to the doctrine of Natural Selection.

The failure of this particular form of doctrine to make good its case, does not of itself necessitate the rejection of the *general* dogma of Evolution, which must stand or fall on its own merits. It involves most important questions, and leads to consequences of the weightiest significance. It cannot be settled on one side or the other by authoritative assertion, by felicitous phrasing, or by refusal to entertain any but one-sided views. *Evidence,* and evidence alone, must be our guide to acceptance or rejection; and where, from the nature of the case, *direct* evidence is unattainable, we must make our choice in accordance with neither superstition nor prejudice, but in accordance with rational probabilities and scientific analogies.

* "Origin of Species," 5th Edition, p. 186.

The broad principle involved is this—that all living beings are connected together by the ties of relationship and descent from a common ancestry. The general outlines of the doctrines are well known; perhaps it is not so generally known how accurately every step of the specialization and evolution of higher from lower forms is understood. Professor Haeckel is one of those fortunate men to whom nothing is doubtful and nothing is obscure. He knows exactly when the first and simplest living creatures arose; through what stages of variation the succeeding races passed; and by what forms of life our direct ancestors were represented at any epoch in the history of our globe. All this strange story is told to us with the same matter-of-fact narrative simplicity, that might be used by a writer of the chronicles of the recent years of his country's history.

The earliest ancestors of man (we are told*), as of all other organisms, *were* living creatures of the simplest conceivable kind,—organisms without organs, like our modern *monera*. These originated out of simple inorganic compounds of carbon, hydrogen, oxygen, and nitrogen, about the beginning of the Laurentian period. For the *proof* of this position we are referred back to p. 301, where the same assertion is made, and we are again referred to another page; until at last we find that we are bound to accept this fact on the "weightiest general grounds" (*aus den wichtigsten allgemeinen Gründen*).

From the *monera*, by numerous, successive, minute variations, the result of *purely mechanical causes*, were developed the *Amœboid* races; from these the *Planœada*; from these again the *Gastræada*. These latter are a very important order of beings. They are described minutely and at great length, and delineated most elaborately. It appears, however, ultimately, that they belong to a purely imaginary world; that there is no evidence whatever of their existence at any period; and that they are placed here to fill a gap which would otherwise sadly have spoiled the symmetry of the theory. None the less is it *absolutely proved* that from these *Gastræada* sprung two great divisions of animal life, one of which branched off into the Zoophytes and Sponges; whilst the other formed the great trunk of the Worm tribe.

And at this point we are reminded by the author† that by poets and others men are often compared to worms, and spoken of as "poor worms," as "miserable worms," and as "blessed (*allerliebster*) worms," all unconscious of the aptitude of the comparison; for there can remain no possible doubt that "from these were developed all vertebrate animals, and that a long line of extinct worms belonged to our direct ancestry at this period."

But here a difficulty occurs—or what would be a difficulty to naturalists who confined themselves to observation and reason. The *Vertebrata* must be developed from something; and as yet there has been no smallest indication of anything like a spine, or a rudiment of

* "Nat. Schopfungsgeschichte," p. 578. † "Anthropogenie," p. 398.

anything that could represent, or be converted into, one. It costs our author nothing but a stroke of his pen to invent the *Chordonia*. And what is the *Chordonia*, and whence did they come? They were developed from the worms by the formation of a spinal marrow, and a *chorda dorsalis?* * Nothing more—the most trifling modification!—and we are at once provided with the root and stem of the whole Vertebrate division. It is scarcely any drawback to this stroke of genius to say, that there is no evidence whatever that such an order of living beings ever existed, that no one has the least conception of what they were like, or of any of their attributes. That they existed, about the Silurian period, is *most certain*; otherwise the Ascidian, on the one hand, and the Amphioxus and the Acranial fishes generally, on the other, would have been left without an ancestor!

After this, however, we get on smoothly and well. From the *Chordonia* arise the lowest fishes, then the Lampreys, the Sharks, and the *Dipneusta*. These were succeeded lineally by the *Sozobranchiæ* (animals something like the Proteus and the Axolotl); when we have arrived safely as far as *Amphibia*. Here, again, a slight difficulty threatens, but only threatens. It is got over by the interpolation of another imaginary order of beings, the *Sozura* (or *Schwanzlurche*), creatures resembling Tritons and Salamanders. "They lived about the second half of the Palæolithic age, in the Permian period, and, perhaps, even so early as the Carboniferous. The PROOF of their existence is this: that the *Schwanzlurche* are a necessary middle-term between the preceding and the following orders!" † Further than this no one knows anything about them.

Still less, if possible, is known about the next order in succession, of which these problematical creatures were the necessary forerunners. It seems that some common stem was needed from which to derive reptiles, birds, and mammalia, including Man; and this stem was supplied by another fanciful order of beings, called *Protamniota*. They arose from "unknown *Schwanzlurche*" about the beginning of the Secondary period, in the Trias, or, perhaps, in the later Permian. What the *Protamniota* were like (says Mr. Huxley)‡ "I do not suppose any one is in a position to say." Probably not. To them, however, succeeds another order, described as the "long-since extinct and *unknown* stem or trunk from which proceeded all the *Mammalia*, which we call *Promammalia*." It is supposed that these animals were probably nearly allied to the *Monotremata*, the Ornithorhynchus, Echidna, &c. It costs but little—*on paper*—to show how these were naturally and easily derived from the *Protamniota, merely* "by manifold advances in internal organization, by the conversion of scales into hair, and by the formation of a lacteal gland, to furnish milk for the nutrition of the offspring."§

From this time to the end, we are on more familiar ground ("*wird*

* "Nat. Schopf. p. 583. † *Ibid.*, 537. ‡ "Critiques and Addresses," p. 318.
§ Haeckel, *op. cit.* p. 588.

uns heimischer zu Muthe"). We have arrived at the *Marsupialia*, from which diverge, in one direction, the carnivora; in another, whales and herbivorous animals; whilst the direct pedigree of Man is carried forward through the *Prosimia* (or *Halbaffen*), the nearest living allies of which are the *Indris* and *Loris*; through the Catarrhine apes, represented most nearly, perhaps, by the Semnopithecus; through the *Anthropoid* apes, Orang, Gibbon, Gorilla, and Chimpanzee; and through the final stage, before Man himself—that of the *Pithecanthropi*, or "speechless original men."

Of these, our immediate predecessors—whose nearest modern allies are "deaf mutes, idiots, and cretins"*—we are told that they lived apparently about the close of the Tertiary epoch. They were developed from the Anthropoid apes by assuming, permanently, the upright position, and by the corresponding differentiation of the anterior and posterior extremities. "Although these ape-men (*Affenmenschen*) much more closely approximated to perfect man than the Anthropoid apes, not only in external form, but also in their inward spiritual development (*innere Geistesentwickelung*), they still lacked that special characteristic of Man, proper—articulate speech; and with it, the development of the higher self-consciousness and conception of ideas."† The *certain proof* that these dumb men preceded us, is to be found in the science of comparative philology!! And we are to expect to find their fossil remains at some future time, when what is now the bed of the Indian Ocean is upheaved and inhabited.

Finally, the *true men* "were developed from the foregoing by the gradual conversion of brute-howling into articulate speech; and along with this function went naturally, hand-in-hand, the development of the larynx and the brain. This took place in the early Quaternary, or Diluvian period; or possibly earlier, in the later Tertiary."‡ And, as by the almost general consent of comparative philologists all known languages cannot be derived from one common root, so there must have been several separate transitions from the *Pithecanthropi* to the true-speaking men.§

On *its own* merits it would scarcely have been necessary to enter into so lengthy an analysis of this pedigree. But the "Natürliche Schöpfungsgeschichte" of Professor Haeckel has acquired an adventitious importance by being stamped with the seal of approval by Mr. Huxley; and, as an almost natural consequence of this, the doctrines therein contained are accepted, doubtless, by thousands in our own country, as well as in Germany, as constituting the foundation of their belief. In the *Academy*, in 1869 (an essay republished in 1873),‖ Mr. Huxley so far endorsed this work as to say, that "there is *only one point* upon which I fundamentally and entirely disagree with Professor Haeckel, but that is the very important one of his conception of geological time. . . ."

* "Anthropogenie," Table, p. 378. † "Natur. Schopf.," p. 591. ‡ *Ibid.*
§ *Ibid.* ‖ "Critiques and Addresses," see p. 310.

We are, therefore, justified in supposing that this strange farrago of wild conjecture, fertile invention, and reckless assertion, contains the essential summary of the doctrine of Evolution, to the belief in which Mr. Huxley pledged himself, when, on the 9th of April (as on many other occasions), before a distinguished assemblage of scientific men and others, he announced, *ex cathedrâ*, that Evolution was no longer a hypothesis, but an historical fact, and that, in truth, no other theory could be said to have an existence, except one which he seemed to consider too "shocking and revolting to common sense" to do more than distantly allude to. No doubt the reference was here made to what Mr. Herbert Spencer considers the effete and impossible idea of Creation.

When we leave the region of poetry, or that domain of quasi-science so well covered by writers like Jules Verne, we are entitled to expect something beyond mere authoritative dogma—something, at least, *resembling* proof and demonstration. If, in this present case, we require this, we are naturally surprised to find on how small and feeble a foundation of fact this mighty superstructure, which is now and for all future time to supersede all mere speculation, is based. Evolution has been proclaimed, and re-affirmed so constantly, so loudly, and with such unbounded confidence, that it has been implicitly accepted by many, under the very natural conviction that men illustrious in science would not so positively affirm these positions unless they could be supported by evidence, forgetting that the history of science in all time abounds with similar instances where zeal has outrun discretion.

The first and most obvious consideration that strikes us, in entering upon the inquiry, is this, that all that we *know with any certainty* concerning organic beings lends no support to any hypothesis of Evolution. History, observation, and experiment, alike, proclaim the absolute constancy of specific forms,—varying, no doubt, in secondary and non-essential characters to even an indefinite extent, but never passing the limits of the *species ; species* being generally understood, in this argument, to imply a group of animals producing offspring continuously fertile, *inter se*, and with the parent stock. This is absolute and without exception. No one instance is known of the variation here implied. Species A invariably produces species A, and even though it may be A_1 or A_2, or A_3—or even A_n—each of these, to the end of the chapter, presents the *physiological* characters of the parent A, and at no stage is there observable any modification of the original mutual fertility.

Thus *direct* testimony is wanting, and although we were *once* taught by Mr. Huxley that the "*only way*" in which the hypothesis of Evolution could be demonstrated, would be by "observation and experiment on the existing forms of life," I would not lay too much stress on this point. On any theory of progressive modification, change of specific type must be an extremely slow process ; and the few brief years over which the longest personal observation can extend, or even the few thousand years of our historical records, must be but as a moment

compared with the countless ages that have elapsed since the formation of the Cambrian system.

Still the fact remains that all our positive and direct knowledge as to species contradicts the Evolution hypothesis. The evidence for it must therefore be inferential. It is supported chiefly on three grounds. The first relates to the resemblances and affinities of structure and function obtaining everywhere throughout animated Nature, which are supposed to be inexplicable on the theory of separate creation, and only to be understood as the result of a common descent. The second refers to embryological considerations,—equally mysterious on the theory of Creation,—equally clear when viewed by the light of Evolution. The third is derived from the study of Palæontology, and the geological record generally, which is said to reveal certain successive forms of animal structure so arranged that it would be "an insult to common sense" to attempt to explain them on any other hypothesis than that of Evolution.

As a psychological study it is interesting to observe how many things are deemed *impossible* to the Infinite wisdom and power which (by the terms of the supposition) presided over the arrangements of our world, which are perfectly clear and comprehensible when considered as the result of blind chance, and the operation of mechanical causes only. The "grand fact," says Mr. Darwin, "of the grouping of organic beings seems to me utterly inexplicable on the theory of Creation."* It might appear difficult to say *why*, unless it be by confessing that perfect intelligence could not devise, though an interminable series of accidents might accomplish, a scheme calculated to excite the admiration of all who study it. And again, "Why should the brain be enclosed in a box composed of such numerous and such extraordinary-shaped pieces of bone? How *inexplicable* are these facts on the ordinary view of Creation!" †

The most noteworthy of Mr. Darwin's puzzles refers to the existence of certain formations in animals, which "bear the plain stamp of *inutility*." These are all pronounced "utterly inexplicable," on the view of "each organic being . . . having been separately created;" but natural selection reveals Nature's "scheme of modification, which it seems that we wilfully will not understand."‡ In other words, by the terms of one hypothesis, boundless wisdom and power, working intelligently, though often mysteriously to us, fails to explain an *apparently useless* structure; which, however, is made abundantly plain and comprehensible by another hypothesis, the very existence of which depends on the supposed selection and preservation of "*useful variations*" only!

In like manner, Mr. Huxley loses no opportunity of assuring his readers and hearers that nothing but Evolution can account for the revelations of the geological record, and treats with unutterable contempt and indigna-

* *Op. cit.*, p. 471. † *Ibid.*, p. 436. ‡ *Ibid.*, p. 480.

tion the idea that creation may have "intruded," and "the notion of any interference with the order of Nature."* He finds that the Crocodiles of the Chalk Period differ somewhat from those of the "Older Tertiary;" and these again are not identically the same "with those of the Newer Tertiaries, nor are those identical with existing forms." † He finds in the Eocene an *Orohippus;* in the Miocene a *Mesohippus* and *Miohippus;* in the Pliocene, a *Pliohippus* and an *Hipparion;* and in the "recent" period, a *Horse;* all these presenting very close and interesting morphological relationships. He finds a succession of Cray-fish, from Mesozoic times until now, which are not exactly alike; and to each of these series he infallibly appends a little discourse tending to the glory of Evolution and the discredit of Creation, all on the same type as that which concludes his very interesting monogram on the Cray-fish. These, he says:—

"Have been gradually evolved in the course of the Mesozoic and subsequent epochs of the world's history from a primitive Astacomorphous form.

"And it is well to reflect that the only alternative supposition is, that these numerous successive and co-existent forms of insignificant animals, the differences of which require careful study for their discrimination, have been separately and independently fabricated, and put into the localities in which we find them. By whatever verbal fog the question at issue may be hidden, this is the real nature of the dilemma presented to us not only by the crayfish, but by every animal and by every plant; from man to the humblest animalcule; from the spreading beech and towering pine to the micrococci which lie at the limit of microscopic visibility."

Now on this question there has been a good deal of misrepresentation, or misapprehension at least. It must be evident to any one who will think for himself for one moment, instead of being led away by empty phrasing, that the one theory is not only as applicable, but as simple and rational, as the other, in accounting for any of the facts of natural history or palæontology. If Creation, as a theory, be put out of court altogether as an *à priori* impossibility, under all conditions—well and good, there is nothing more to be said. But if it be allowable to argue the point at all, then surely there is no difficulty in understanding how, under either theory, certain arrangements are brought about. If species A be *developed* ultimately into species B, and this again, after long ages, into species C; and so on through the alphabet; this evolution, by the terms of the hypothesis, takes place by virtue of each succeeding one being, in some small degree, better fitted for its *then* surroundings than its predecessor was or would have been. The theory of Evolution can only account for each animal having attained its present structure, appearance, functions, and geographical distribution, on the supposition that these were *most appropriate* to it, and to each other; any individual or family having an organization unfitting it to struggle with its surroundings, as climate, &c., being ruthlessly exterminated. In other words, *Evolution* has shaped out and located each species or race into that form and in

* "American Addresses," p. 2. † "Lay Sermons," &c., p. 200.

that position which will be the most perfectly adapted to each other. In this sentence substitute "the Creator" for "Evolution," and we find fulfilled the very first and essential condition of all our ideas connected with intelligent creation.

It is no doubt possible, by well-selected language, to make the "fabrication" of successive crayfish seem absurd enough; but if the small differences referred to were brought about by any *vera causa*, to subserve any useful purpose, there is assuredly nothing ridiculous in attributing the same *purpose* to an intelligent act of Creation, including also *modification* perhaps, rather than a new "fabrication;" in accordance with an axiom which has always appeared to me as one of the most philosophic phrases of modern times,—that of "*the continuous operation of the ordained becoming of living things.*"*

What *ought* Palæontology to say in support of Evolution? and what *does* it say? It ought to reveal to us an almost infinite variety of transitional "links which must formerly have connected the closely-allied or representative species found in the several stages of the same great formation" (Darwin). As a matter of fact "geology assuredly does *not* reveal any such finely-graduated organic chain; and this is, perhaps, the most obvious and gravest objection which can be urged against my theory." † Mr. Darwin then attempts to account for this on the principle of the imperfection of the geological record, all of which is sufficiently well known. On the other hand, Sir Charles Lyell, a geologist at least as eminent as any who have succeeded him, appeals to this same imperfection as an argument rather telling *against* than in favour of Evolution. He says:—"It has always appeared to me that the advocates of progressive development have *too much overlooked* the imperfection of these records; and that, consequently, a large part of the generalizations in which they have indulged in regard to the first appearance of the different classes of animals, especially air-breathers, will have to be modified, or abandoned."‡

There is no doubt that of late years there has been evinced a tendency towards other views on this branch of the subject; but whether on sufficient grounds, remains to be shown. In 1862 Mr. Huxley was of opinion that an impartial survey of the positively-ascertained truths of Palæontology was calculated to "*negative*" the doctrines of progressive modification."§ In 1870, certainly in accordance with further evidence, Mr. Huxley somewhat modified this "Brutus-like severity" of doctrine. He fully confirmed it "so far as the *invertebrata* and lower *vertebrata* are concerned;" but, he added, in reference to the higher vertebrata, that "the results of recent investigations, however we may sift or criticize them, seems to me to leave a clear balance in favour of the doctrine of the Evolution of living forms one from another."‖ Finally,

* Prof. Owen's "Palæontology," p. 3.
† "Origin of Species," 1st Edition, p. 280.
‡ Address to the British Association, 1859.
§ "Critiques and Addresses," p. 182.
‖ *Ibid.* p. 183.

as a sequel to further discoveries in reference to the various serial forms of animal remains alluded to above, especially those of the horse and its predecessors, Mr. Huxley proclaims Evolution to be an established, historical fact,—and refuses to consider any further objection to it.

From Mr. Huxley's standpoint, this is legitimate enough. By him, and his school, it is held as a foregone conclusion that the theory of special creation is a "revolting" absurdity. For them also, succession and typical resemblance necessarily imply consanguinity and common descent,—still a perfectly logical conclusion from their premises. To those, however, who prefer to distinguish between things that differ, these are by no means *necessary* truths.

What do these serial arrangements—of horse, of crocodile, of crayfish, and many other creatures—prove? They prove *succession* of similar, yet in some respects dissimilar, forms; they *suggest* descent from a common ancestry; and this *suggestion* will represent doubt or demonstration, according to the varying preparedness or prejudice of the mind into which it enters. Even were it granted, for the sake of the argument, that all these successive forms had respectively descended from a common stock, we should still be a whole world apart from any absolute *proof* of the doctrine of Evolution.

Take the case of the horse, as a typical illustration, and the one which seems probably to have taken the strongest hold on Mr. Huxley's mind. It is not necessary to enter into any detailed description of the successive forms found between the Eocene *Orohippus* and the true horse of our own epoch. Suffice it to say that these remains present a most interesting and instructive series of modifications in certain parts of their structure, and notably of the feet. These modifications are supposed to indicate *specific* differences; and I would not for one moment attempt to throw discredit on Mr. Huxley's unequalled knowledge of the subject, by suggesting any doubt that for *purposes of classification*, they may be so considered. But it is not, *therefore*, and necessarily, to be taken for granted that *physiologically* they each represent a different *species*, in the sense in which *species* is generally defined in these discussions—viz., as a group which produces offspring continuously fertile *inter se*, and not continuously fertile with allied groups.

I *assert* nothing, for I have no means of knowing; but I ask, will any naturalist affirm that such can be *proved* to be the case in any of these instances; or that the differences between them are greater than those which *occasionally* are observed in species which we know, by the above test, to be physiologically the same? The formation of the feet differs considerably; but is this a difference of species, or only of race? With reference to the lateral toes of the hipparion, Mr. Huxley tells us that "they could have had but very little functional importance, and they must have been rather of the nature of dew-claws, such as are to be found in many ruminant animals."* Such being the case,

* "American Addresses," p. 81.

it is only what might be expected, that these toes, in accordance with a well-known law, should dwindle, and be represented after many succeeding generations, by mere rudiments. There seems also nothing impossible in the supposition that, in accordance with gradual changes in the physical conditions, and the medium generally in which they lived, similar lapses of functional importance, and a similar gradual dwindling and partial disappearance of certain elements of the extremities, may have occurred in *all* these successive *races*, without any absolute change of *species* physiologically.

Of the extent and nature of the modifications that may be caused by physical surroundings, our knowledge is almost in its infancy. We know some *facts*,—of their true cause we know *nothing*. Pallas relates that in certain sheep of Central Asia, the tail disappears, and is reduced to a simple coccyx, on each side of which is a hemispherical mass of fat weighing 20 or 30 pounds each. This peculiarity entirely disappears in a few generations, when the animals are removed to another climate. American oxen are descended from European stocks. In Buenos Ayres their descendants have preserved the horns; in Mexico they have lost them.* A race of Corsican deer was at one time supposed to be a new species, until one of them was taken to Paris for some years, where it gradually assumed the usual typical form.

Joints also and appendages seem to be very variable, from undefined causes, without necessitating any physiological change of species. An instance, though one of not much importance, is met with in the common dog. Some of the smaller dogs have only four toes on the hind foot; whilst in some of the largest the fifth is fully developed. Yet physiologically they are equally *dogs*. In some pigs there is observed a very remarkable and important modification of the foot, in which a third median toe is developed, and the whole is enveloped in a single hoof, so representing the *solidungulate* type. This is at least *as* remarkable a modification as that of the foot of the hipparion as compared with that of the horse, yet these remain *physiologically* pigs. Oxen have been found with thirteen ribs, and an additional vertebra, yet they are still *oxen*.

These few illustrations, which might be multiplied indefinitely, must be taken for just as much as they are worth. It is not professed that they *prove* anything whatever,—except this, that we ought to be very cautious in proclaiming loudly and dogmatically the absolute demonstration of an untenable hypothesis on the strength of facts which will bear many different interpretations, each one of which is more in accordance with observed analogies, than the one so promulgated. So far as these considerations lead us, the question is still an open one.†

* Quatrefages.

† Were it permitted to us to adopt the same rules of argument as those used by the Evolutionists, there would be no difficulty in replying trenchantly to this question of the Horse series. I should at once say that the Horse, as we know it now, existed contemporaneously with the *Orohippus* in the *Miocene* period; and that there had been no change from that to modern times. When the very obvious objection was made to this, that it

But apart from what geology does *not* tell us, there is a history which it does relate, or suggest,—a history which is by no means in accordance with the theory now under discussion, which, on the contrary, seems absolutely to controvert it. The succession of forms of life on our globe is demonstrably *not* such as ought to be the case on the theory of Evolution. It was not the small and feeble species, or most generalized forms that first appeared, either amongst molluscs, fish, reptiles, or mammalia. We look in vain now for the representatives of the gigantic fishes of the Old Red Sandstone. And where are the mighty reptile tyrants of air, earth, and water of the Oölite? Have they been "improved" and "preserved" into the puny races of modern reptiles? Where are the ponderous monsters that shook the Eocene and Miocene earth with their massive tread? Where is the megatherium, unless *improved* into the modern sloth? These races appeared in the plenitude of their development and power; and as their dynasty grew old, it was not that the race was *improved* or *preserved* in consequence, but they dwindled and were, so to speak, degraded, as if to make room in the economy, of Nature for their successors.*

From all this it would appear to result that we can obtain no indication of any support for the doctrine of Evolution either from history, observation, experiment, or Palæontology. Any conclusion from experiment is, perhaps, not to be expected as yet; nevertheless, were the characters of species so plastic as it is sought to prove, it can scarcely be conceived that some slight evidence of this modifiability would not have been met with, either in Nature, or as the result of artificial selection. We do not expect to witness the entire process of the conversion of one species into another, either naturally or artificially; but it is surely a reasonable surmise that amongst the countless millions of variations that must be constantly in progress, on this hypothesis, we should occasionally meet with one which would fulfil in some small degree the necessary conditions,—that is, one that would exhibit some incipient failure of fertility with the parent stock, and increased fertility with others varied in like manner. But it is not suggested that *one* such instance of this, the very first condition of formation of a new species, has ever presented itself.

Amongst animals we observe at least five distinct types, between any two of which there is no known or suspected transitional form,—the Protozoa, the Cœlenterata, the Mollusca, the Annulata, and the Vertebrata. We have seen above to what straits Professor Haeckel is reduced

was a mere assertion, unsupported by any evidence whatever, I should appeal to the "imperfection of the geological record;" and assume that were it perfect it could do no other than testify in my favour. If it were suggested that this mode of argument was not *science* of any sort, and would prove any absurd proposition whatever, I should then reply, that the "*certain proof*" of the then existence of the horse was to be found in the fact that *it was necessary for my theory*. (See Haeckel's "Natürliche Schöpfungs-geschichte," chap. xxii. *passim*; and especially at pp. 583 and 587.)

* A vast mass of interesting matter bearing upon this question may be found in Mr. Huxley's Essay on "Palæontology and Evolution," included in the volume entitled "Critiques and Addresses," 1874.

when he attempts to derive these from one common stock, and to draw out a plan of the succession of forms of life. At many points in his series he has to interpolate entire orders, which are so purely imaginary that he does not even profess to have any evidence to adduce for their existence, except that they are "necessary" for the completion of his theory. For the most part these may be passed over in silence; but one of them is at once so audacious, so cumbrous, and so impossible, that it requires a passing notice.

The connection of the *Vertebrata* with the lower members of the animal world, and the difficulty of their derivation, by natural process, from any known or imaginable forms, has always presented a serious stumbling-block to the Evolutionist. In his work on the "Descent of Man," Mr. Darwin traces the human pedigree quite smoothly and easily downwards as far as the fishes; but there a difficulty arises—How came the fish to have a vertebral column, and from what was it evolved? There appeared no readier way of answering this inquiry than by the discovery that the larvæ of the Ascidians (invertebrate hermaphrodite marine molluscs) presented some analogy to the Vertebrata in certain points of their structure and development. Hence Mr. Darwin considered himself "justified in believing that at an extremely remote period a group of animals existed resembling in many respects the larvæ of our present Ascidians, which diverged into two great branches,—the one retrograding (!) in development and producing the present class of Ascidia; the other rising to the crown and summit of the animal kingdom by giving birth to the Vertebrata."*

Haeckel indulges in no such half-hearted conjectures as this. When the period arrives when the Vertebrata *must* be introduced, there is no craning before he leaps, no pusillanimous hesitation. He takes a worm, and, with a stroke of his pen, endows it with a spinal marrow and a chorda dorsalis, on "mechanical principles;" and having further improved it, he calls it *Chordonia*,—the parent of all the Vertebrata,—and a sort of distant relative, perhaps second cousin, of the Ascidian. It is placed in its natural order as though it had a legitimate claim to be there; and it never seems to have occurred to the author that, even were it true, this process in no one respect resembled Evolution. I feel some reluctance to speak of this as it deserves; but I consider it as little short of a monstrous literary fraud, as it would be a commercial fraud to pass a forged note in a packet of real ones. I may add, that if there be any truth or reality whatever in the principles of the science of Embryology, it is as impossible for the Ascidian to stand in this relationship to the Vertebrata as it would be for any member of a genealogical tree to be represented at one and the same time as his own grandfather and his own grand-nephew. I have given the demonstration of this position elsewhere;† and space does not admit of even a condensed repetition of it.

* "Descent of Man," vol. i. p. 206.

† "Winds of Doctrine."

I can only briefly allude to the extension of the theory of Evolution to Man. To the doctrine which teaches that Man is lineally descended from a Catarrhine ape, Morphology gives some qualified support; Embryology, fairly considered, renders it very improbable; the science of Man demonstrates it to be impossible.

It may be conceded at once that the resemblance, in essential type, between man and some apes is very strong indeed; that "the structural differences which separate man from the gorilla and the chimpanzee, are not so great as those which separate the gorilla from the lower apes,"* and that "the human body contains no single organ which might not have been† inherited from the apes." Nevertheless, there are differences, and of such a kind as renders it highly unlikely that man is merely a higher ape. It is very improbable that smooth-skinned man should have descended (at least by *any* process of selection) from hairy ancestry, but this is not much to be relied upon. It is improbable in the extreme that a walking animal should descend from a climbing animal, so improbable that it has appeared to many, even of those who hold the doctrine of Evolution, as a fatal bar to the ape theory; and they have attempted to trace out some other brute origin for man.‡ It is supremely improbable that man, the most helpless, and the longest helpless, of all animals, should be descended, in accordance with any rational theory of *progressive* development, from any of the brute creation.§

But perhaps the most significant point of difference in the mere mechanism of apes and men, is the opposability of the great toe, or the thumb of the posterior hand, in the former, as contrasted with the same structure in the latter. The importance of this is well understood by the advocates of Evolution, and Haeckel thereupon affirms most positively that this faculty or formation is *not* peculiar to apes; but that there are "races of wild men in whom the great toe is as opposable as the thumb,"‖ adducing other illustrations also. Against this we have the positive testimony of an accurate and cautious observer, Mr. Wallace, to the following effect:—

"The common statement of travellers as to savages having great prehensile power in the toes, has been adopted by some naturalists as indicating an approach to the apes. But this notion is founded on a complete misconception. Savages pick up objects with their feet, it is true, but always by a *lateral* motion of the toes, which we should equally possess if we never wore shoes or stockings. In no

* "Man's Place in Nature," by Prof. Huxley, p. 103.

† Haeckel's "Anthropogenie," p. 694;—only that instead of "might not have been" Haeckel says "*is* not" inherited, &c.

‡ M. Quatrefages ("The Human Species," p. 107) says on this subject that "from the point of view of the logical application of the law of *permanent characterization* . . . . man cannot be descended from an ancestor who is already characterized as an ape, any more than a catarrhine tailless ape can be descended from a tailed catarrhine. A *walking animal cannot* be descended from a *climbing one*.

§ C. von Baër gives it as his verdict, that it is *impossible* that a man can by progressive development (*fortschreitende entwickelung*) have originated from an ape. Virchow is of the same opinion.

‖ "Nat. Schopf.," p. 568.

savage have I ever seen *the slightest approach to opposability* of the great toe, which is the *essential distinguishing feature of apes*; nor have I ever seen it stated that any variation in this direction has been detected in the anatomical structure of the foot of the lower races."*

The evidence from Embryology is of too technical a nature to be introduced here. It may be briefly indicated as turning upon the fact that the order of embryonic development in the ape, in some most important parts, is in *inverse order* to that of man, from which the Embryologist will conclude, necessarily and absolutely, that man is *not* descended from an ape.

Before leaving the subject of *bodily* relationship, it may be suggested that on either theory of Ontology, whether of special creation or of Evolution, there is exactly the same *reason* for the very close resemblance in structure that obtains between man and the higher animals. It is acknowledged on all hands, without the necessity for the prolix demonstrations that have been given of the position, that man is an animal, however much more he may be, and whatever his origin; and that he has to perform a greater variety of *selected activities* than any other animal. If, then, animals generally are constructed or evolved according to the type best adapted to their special activities, it follows, as a matter of logical necessity, that man should be constructed in accordance with the best and highest of these types. With reserve, I *believe* that man is the most perfect of machines—that is, that, *cæteris paribus*, he can do more foot-pounds of work in proportion to *fuel* than any other animal or machine.

When we come to the Science of Man specially, we find that the evidence for his distinct nature, consequently for his independent origin, is overwhelming; the demonstration is easy, precise, and incontrovertible. By the possession of articulate speech, of a conscious reasoning† and reflective faculty, of a moral sense and a religious sentiment; by his conception of abstract ideas; by his faculties of judgment and conscious volition; it is evident that man is neither *from* nor *of* the brute; that he "differs fundamentally from every other creature which presents itself to our senses; that he differs absolutely, and therefore differs in origin also."‡ In one comprehensive particular he also asserts that he stands *alone*,—in his capability for continuous progress, and his power of utilising the "registered experience" of successive generations.

Finally, whatever may be his structure, it is recognised on all hands that there is an altogether "*immeasurable* and *practically infinite* divergence of the human from the Simian stirps."§ This is a judgment of the utmost importance, and involves a perfect demonstration of our

* "Tropical Nature and other Essays," by Alfred R. Wallace, pp. 269-90.

† Man is "the *only consciously intelligent* denizen of this world." Mr. Huxley's "*Man's Place in Nature*," p. 110.

‡ Mr. Mivart's "Lessons from Nature," p. 190.

§ Mr. Huxley, *op. cit.*, p. 103.

position. For, whether the structural difference between man and the apes be great or small, it is certainly *finite*, whilst the divergence in essential *nature* is *practically infinite*. We are, then, driven to this conclusion—that the nature of man is not a "function"* of his organization, and that there is *something* superadded which is not provided for by any theory of Evolution, of selection, or of direct inheritance. On this supposition, all that has been urged as to organic resemblance comes to have *no* significance; and the verdict must be, that man's descent from the apes is, if not *impossible*, at least *not proven*. Q.E.D.†

The differences in the moral and spiritual nature of man and those of the brute have, of course, not been overlooked by the Evolutionists, and they have denied, neutralized, or evaded them according to their respective lights and tendencies. Thus, with regard to articulate speech,‡ one school, represented by Dr. Büchner (the happy propounder of the fact that *Holothuridæ* engender snails!) openly proclaims that animals *have* articulate speech. Mr. Darwin, with his usual candour, confesses that this endowment is "peculiar to man." Mr. Huxley agrees, but attributes the want of it to some "inconspicuous structural difference."

The same diversity appears with regard to the moral sense, and this is the last point which can be noticed at this time. It has been seen how the doctrine of Evolution, as elaborated by Professor Haeckel, and endorsed by Mr. Huxley, leads us, logically and inevitably to the conclusion,—which moreover it is not sought to disguise,—that there is no such thing as *Free Will*. From this also it follows, as an identical proposition, that there can be no such thing as a *moral sense*; or rather, that any term or phrase implying *morals*, as such, in any way, has no possible meaning. We may have *conduct*,—and that conduct may possibly be of any degree of excellence, in its adaptation and obedience to gradually evolved social requirements; but of *morals* proper, as generally understood, there can be no question. Haeckel cuts the knot arising out of these considerations with characteristic directness. After discussing the subject at some length, he says, "The final result of this comparison is this—that between the highest brute-souls (*Thier-Seelen*) and the lowest human souls there exists only a small *quantitative* and no *qualitative* difference; and that this difference is *much less* than that between the highest and lowest human souls, or between the highest and lowest brute-souls."§ On the other hand, the school represented by Mr. Huxley and Mr. Herbert Spencer denies to man the possession of any special inherent moral sense—

* I here use the term "function" in its mathematical sense.

† Mr. Wallace's arguments in favour of the special origin of man are cogent, clear, and philosophical, but it would be doing them an injustice to condense them into the small space at my disposal.

‡ Articulate speech is mentioned here, because so inextricably attached to the development of the moral nature.

§ "Nat. Schopf.," p. 652.

that is, any other than such as can be, and has been, derived by way of Evolution from more simple ideas, such as the desire for pleasure, the avoidance of pain, or the fear of punishment. Commenting on Mr. Mivart's expression that there is "no trace in brutes of any actions simulating morality which are not explicable by the fear of punishment, by the hope of pleasure, or by personal affection," Mr. Huxley says that "it may be affirmed with equal truth that there is no trace in men of any actions which are not traceable to the same motives. If a man does anything, he does it either because he fears to be punished if he does not do it, or because he hopes to obtain pleasure by doing it. . . ."*

To the majority of thinking men, who still hold that we have some innate perception of right *as* right, and of wrong *as* wrong, irrespective of consequences, however diverse or distorted such ideas may be, these doctrines may be left to speak for themselves. It is impossible now to enter upon so broad a subject as the nature and origin of the moral sense. Happily for a benighted world, a ray of light shines through the worse than Cimmerian darkness into which we seemed to be plunging. It may prove to be but a very rushlight, yet it proclaims itself loudly to be the true light, and we welcome it as a *promise* of illumination, trembling and shuddering meanwhile at the dangers through which we have unconsciously been passing,—like the lost traveller who faints when the morning reveals to him the horrors through which he has passed in the darkness of the night.

Mr. Herbert Spencer sees clearly that "moral injunctions are losing the authority given by their supposed sacred origin;"† and lest, unhappily, the world should be left wrecked, compassless, and rudderless on the dark ocean of doubt and perplexity, he, as ever ready with help and counsel, has departed in some measure from the pre-arranged order of his revelations, hastening to accomplish the "secularization of morals," a need which "is becoming imperative." For, he says, "few things can happen more disastrous than the decay and death of a regulative system no longer fit, before *another and fitter* regulative system has grown up to replace it."‡ This want is supplied; the danger is past, and we breathe again; though lost in wonder as to what might have become of us and of the world generally, if this happy thought had not struck the author.

There is an extreme simplicity and directness of purpose about this theory of latter-day morals, which is ushered in with so much pomp and circumstance. *Conduct* is synonymous with "morals;" and conduct is primarily divided into actions that have a purpose, and those that are "purposeless;" for instance, "such actions as those of an epileptic in a fit are not included in our idea of conduct."§ Action, with a purpose or conduct, then, is defined as being good or bad, according as it is

* "Critiques and Addresses," p. 289. † "Data of Ethics," Pref. p. iv. ‡ *Ibid.*
§ *Op. cit.*, p. 5.

"well or ill-adapted to achieve prescribed ends" (p. 21). A *good* knife is one that cuts well; a *good* gun one that carries far and true. "Conversely, the badness alleged of the umbrella or the pair of boots, refers to their failures in fulfilling" certain ends. A *good* jump is one that achieves its purpose,—and a *good* stroke of billiards is one where "the movements are skilfully adjusted to the requirements" (p. 22). On the other hand, a shuffling walk and an indistinct utterance are *bad*, "because of the relative non-adaptations of the acts to the ends." And, in like manner, ethically, all conduct is *good* which is well adapted to the effecting of a certain end, which is primarily "the general end of self-preservation" (p. 23). This is further defined (p. 14) as "that increased duration of life which constitutes *the supreme end*."

But it appears by-and-by that there is a more accurate primary meaning of the words *good* and *bad*. We call good and bad "the things which immediately produce agreeable and disagreeable sensations," —and remembering this, and some other allied considerations, it "becomes undeniable that, taking into account immediate and remote effects on all persons, *the good is universally the pleasurable*" (p. 30).

Beyond the immediate personal pleasure and extension of life, which is the "supreme end" of all our adapted actions,—beyond this "egoism" there is an "altruism" to which the egoism must to a certain extent be made subordinate. "In maintaining their own lives and fostering their offspring, men's adjustments of acts to ends are so apt to hinder the kindred adjustments of other men, that insistance on the needful limitations has to be perpetual; and the mischiefs caused by men's interferences with one another's life-subserving actions are so great, that the interdicts have to be peremptory" (p. 24). All of which, when put into plain language, appears to mean, that a life of action, or conduct, or morals, founded upon the pursuit of the "good," which is "universally the pleasurable," would run great risks of being prematurely cut short by an unappreciative community.

These varying interests are discussed largely,—but without making it clear that we have any direct and immediate rule of conduct except the pursuit of pleasure, and the avoidance of pain. That we have any intuitive sense of right and wrong as such, is a supposition too contemptible to be treated seriously. Our moral faculties are no divine endowment; but they have resulted, in accordance with the laws of Evolution, "from inherited modifications caused by accumulated experiences" (p. 55). And ever and again the refrain recurs, that the pleasurable is the good, and the painful is the bad.

Thus we arrive at the satisfactory conclusion that whatever is pleasant is *right*, and whatever is unpleasant or painful is *wrong*; and except in so far as we may be *inclined* to accept certain tribal conventions, we have no other guide to rectitude of conduct.

It seems somewhat unfair, if not absolutely cruel, to attempt to bring Mr. Herbert Spencer's theories to the test of any practical application.

His Constructive Philosophy is so evidently adapted to, and derived from, the contemplation of an ideal world of his own construction; and his physiology is so very remote from that with which physiologists are familiar, that it is difficult to find any common ground on which to meet him. It seems also almost a pity to disturb the simple harmony of his arrangements by any comparison of them with the exigencies of a real world. Nevertheless, in consideration of that large class of readers who are addicted to supposing that they are instructed when they are only mystified, I will endeavour to follow out one or two of his arguments to their logical termination; after having explained what I mean by the difference between Mr. Herbert Spencer's physiology, and that held by scientific men generally.

In another place * I have called attention to the extraordinary statement that "a faculty on which circumstances make *excessive demands* increases,"—a position directly at variance with the experience of medical men and physiologists, who find uniformly that the eye, the ear, the heart and the brain (not to allude to even more obvious and striking illustrations,) all improve in function *only* so long as *moderately* exercised; and all *fail* when "*excessive demands*" are made upon them. A companion idea to this, and one equally at variance with the most elementary principles of physiology, is found in the "Data of Ethics;"† in fact it may be said to constitute the physiological basis of the entire work; as, were this proved to be incorrect, the entire argument would fall to the ground for lack of any support. It is to the effect that "it is demonstrable that there exists a primordial connection between pleasure-giving acts, and contrivance or increase of life, and, by implication, between pain-giving acts and decrease or loss of life." And again at p. 87, it is stated that "every pleasure increases vitality; every pain decreases vitality; every pleasure raises the tide of life; every pain lowers the tide of life."

To enunciate this proposition in plain terms is almost equivalent to disproving it. For it necessarily follows, if this be true, that nothing is so beneficial to life and humanity as perpetual and unbounded sensual indulgence, along with the practice of all those exciting pursuits that may be summed up under the generic term "gambling." Naturally Mr. Spencer has not entirely overlooked this objection to his views, and has, equally naturally, discussed it copiously; but apparently without finding it necessary or practicable materially to modify his position; for after each excursion after an apparent objection, he returns to a more and more decisive enunciation of the same view, that is so clearly expressed at p. 99—viz., that "along with complete adjustment of humanity to the social state, will go recognition of the truths, that actions are completely right only when, besides being conducive to future happiness, special and general, they are *immediately pleasurable*;

* "Winds of Doctrine," p. 107. † P. 82.

and that painfulness *not only ultimate but proximate,* is the concomitant of actions that are *wrong.*" *

By way of testing this doctrine, let us suppose a case, occurring after this "complete adjustment" has been effected,—an adjustment, it may be presumed, which does not necessarily imply the possession of universal knowledge and skill in every department of science in each and every individual. I suppose then, that my friend C. has a valuable collection of scientific instruments, to which I and others have occasional uncontrolled access. On one of these occasions, as a result of my own ignorance and incapacity, I do a great amount of damage to the apparatus, which will cost (say) £1000 to remedy. I assume also that no one is present,—and as is perfectly conceivable, that the circumstances are such that I could not possibly be found out, if I kept my own counsel, —that the damage might be attributed in short to the intrusion of a dog, or the occurrence of a convenient thunderstorm.

Assuming all this, in which there is nothing impossible or inadmissible, I proceed to ask myself what it is my *duty* to do (if such a thing as *duty* can be supposed to exist under modern enlightenment as opposed to *expediency*) and I argue thus:—The old law of conscience, represented by such rules as "Thou shalt," or "Thou shalt not," "Do unto others," &c., and the like, would make my way plain enough. I *must* make prompt confession and restitution, or restoration. But this is certainly unpleasant. Have I not heard something of a new basis of morals, —"another and fitter regulative system?" † Let me see what guide this will afford me. I find that actions to be "completely right" must be "*immediately* pleasurable," and that "painfulness" will indicate that they are "*wrong.*" Now I wish to be *completely right*, therefore I must do what is immediately pleasurable, and avoid what is painful. It is certainly neither immediately nor remotely *pleasurable* to confess my awkwardness and incapacity: and it is as certainly *painful* to pay £1000 unnecessarily. Therefore I shall keep my own secret,—let the dog bear the blame, and bless Mr. Herbert Spencer, and the doctrine of Evolutionary morals. If there be anything more deducible from the new "regulative system" than this, it certainly is so far below the surface as to be undiscernible by ordinary mental vision. And should it appear to any one that this is a trivial and casuistic mode of testing a great broad principle, I would suggest that it is at least as much to the purpose as Mr. Spencer's own speculations on the more favourable views we should take of "pocket-picking," on the supposition that "picking a man's pocket excited in him joyful emotion."‡

My next illustration, however, shall be of the author's own selection; and I will only so far modify it as to take *the whole* of the case proposed, instead of *a part* only. By way of illustrating the essential connection between what is *pleasant* and what is *right*, Mr. Spencer,

* The italics are not in the text. † "Data of Ethics," Pref. p. iv. ‡ *Ibid.*

at p. 261 of the "Data of Ethics," asks us to consider the relation of a healthy mother to a healthy infant.

"Between the two there exists a mutual dependance which is a source of pleasure to both. In yielding its natural food to the child, the mother receives gratification; and to the child there comes the satisfaction of appetite—a satisfaction which accompanies furtherance of life, growth, and increasing enjoyment. Let the relation be suspended, and on both sides there is suffering. The mother experiences both bodily pain and mental pain; and the painful sensation borne by the child brings as its results physical mischief, and some damage to the emotional nature. Thus the act is one that is to both exclusively pleasurable, while abstention entails pain on both; and it is *consequently* of the kind we here call absolutely right."

If this reasoning be of any cogency, it must of necessity bear application to the entire case. Therefore, when the period arrives when this relation must be suspended, and when we find, as is almost constantly the case in *our real* world, that this "abstention entails pain on both" mother and child, we are certainly justified in supposing conversely, that the act of weaning is "*consequently* of the kind we here call absolutely" *wrong!*

It is scarcely necessary to pursue this subject further. There is certainly much *philosophy* afloat, which, if freed from nebulosity, and translated into the vernacular, might easily be mistaken for what is often called by a very different name. There are certain geometrical propositions which it is not the custom to demonstrate directly, but their truth is proved by showing the absurdity of the contrary supposition. This service has been abundantly rendered to the theories of Creation and Intuition by Mr. Huxley, Mr. Herbert Spencer, and Professor Haeckel, by the demonstrations that they have given of the inextricable maze of contradictions, futilities, and impossibilities into which we are led by attempting to follow the guidance of the "only alternative" doctrine—that of Evolution.

I would conclude with an old syllogism:—

"Without *verification*, a theoretic conception is a mere figment of the intellect." *

The theory of Organic Evolution is an unverified theoretic conception.†

Therefore, ORGANIC EVOLUTION IS A MERE FIGMENT OF THE INTELLECT.

CHARLES ELAM.

* Prof. Tyndall's "Fragments of Science," p. 469.

† Inasmuch as the "only" recognized proof has not been furnished,—viz., that arising from "observation and experiment on existing forms of life,"—and no other even plausible one has been offered.