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THEORIES OF EVOLUTION.

The Origin of Species. By CHARLES DARWIN, M. A., F. R. S. London: 1860. 5th Edition, D. Appleton & Co. New York: 1871.

The Descent of Man, and Selection in Relation to Sex. By CHARLES DARWIN, M. A., F. R. S., with Illustrations, 2 vols. D. Appleton & Co. New York: 1871.

On the Genesis of Species. By ST. GEORGE MIVART, F. R. S. New York: D. Appleton & Co.: 1871.

Lay Sermons, Addresses and Reviews. By THOS. HENRY HUXLEY, LL. D., F. R. S. D. Appleton & Co. New York: 1870.

About a year ago, (September 16, 1870,) Prof. Tyndall delivered an address at the Annual Meeting of the British Association, at Liverpool, on the subject of the "Scientific Use of the Imagination." Spoken before a popular assembly, it was adorned with all the semi-poetical graces of rhetoric and fancy, for which the new English school of modern Science is becoming quite celebrated in its efforts to popularize what have always been regarded as rather dry and laborious researches. We can hardly suppose that the Professor intended to announce anything new in the methods of scientific investigation. The illustrations he gives are drawn from

the past as well as the present, and only go to show that any man in the course of his studies may be led to anticipate or *conjecture* certain results which he afterwards verifies by experiment. In the sense in which he uses it, imagination is reduced merely to the power of *guessing*, and so of contriving a wider variety and more ingenious description of experimental processes. Though not quite identical with that faculty divine which

> "gives to airy *nothings*
> A local habitation and a name,"

and which is almost synonymous with *creation*,—that which originally gave meaning to the word *poet*—yet, in the restricted sense here attached to it, it gives great advantage even to those scientific minds which have been trained to wait for their facts before establishing their conclusions. No one can deny the service done by this "Scientific use of the Imagination," as for instance in the science of Astronomy, where some of its loftiest flights have been confirmed by the wonderful revelations of spectrum-analysis. Thus it is, we sometimes say that the *guesses* of Newton were often better than the demonstrations of inferior minds, as when he assumed the combustibility of the diamond, and the undulatory theory of light, without those later facilities of verification which have since vindicated his *pre*-science.

Nevertheless, "*Hypotheses non fingo*" has, from the time of Bacon, been the motto of the Inductive Philosophy: and it is now not superfluous to say, with such books before us as we have named at the head of this article, that any attempt to relax the severity of this maxim will at once lay our modern science open to all the objections and ridicule that were ever heaped upon the mediæval devotion to Aristotelian logic as an in-

strument of knowledge. And doubtless there is danger of variation from the hitherto established rigor of the inductive rule, even if we may not take Prof. Tyndall's oration as a plea or an apology for such a departure. There is danger of exchanging the proper attitude of scientific skepticism for what we may call a sort of scientific *credulity*. The progress of discovery has been so rapid of late years, and the triumphs of scientific research so brilliant, that a glamour of something like "mutual admiration" seems to have come over the minds of many of our eminent savans, which leads them even to hail each other's theoretical speculations beforehand; and in fear or impatience of being anticipated in the arrival at final truths, allows them (by imagination) to jump to the conclusion of problems that have really not been half worked out. The popular mind, too, which, from the swift succession of new and startling discoveries, has almost lost the capacity of being surprised, is prepared to accept almost any announcement from such authority, without inquiring whether it be a mere theory of "imagination," or a truth established by the unquestionable evidence of "all the facts."

Yet the discoveries of our day are not the sole and sudden acquisition of modern science alone. They were preceded and prepared for by the slow, laborious toil of previous generations of scientific thinkers and observers, who laid the lower courses of that vast pyramid which has exalted us to such a wide view of the universe. Every step of progress has depended upon a thousand preceding steps. This reflection should make modesty and humility the most appropriate mental attitude for even the master minds of modern science. That which is already known also still bears small proportion to that which remains to be known. We may

perhaps be sure of that which we already know; but after all, from the nature of the case, that which is still *incomplete* must be still *inconclusive.* It cannot be characteristic of a really scientific mind to push the conclusions of any mere partial, limited, or temporary induction to cover a field wider than was ever brought under human observation, unless indeed it be accompanied with the avowal that the province of science is exchanged for that of the "imagination." The mighty mind of Newton was almost childlike in its utter forgetfulness of self-assertion. To use his own figure, in all that wonderful pathway of discovery in which so few of his own age could follow him, he "felt like a child picking up pebbles on the shore of the Infinite."

To this "scientific use of the imagination" may perhaps also be relegated another striking feature of much of our modern science—we mean the fascinating *literary* dress in which it is so acceptably presented to the public. Science is no longer exhibited to the popular mind as a dry, severe comparison of facts and figures, as bare of ornamentation or extraneous considerations of mere æsthetic interest or attractiveness as it is possible to make them. The "dry light" of Heraclitus and Hegel is not the most popular illumination of our modern science. It comes to us in all the garnish of classical style and poetic illustrations, and shows sometimes the roseate flush of an earnest *animus* and argumentative eloquence. Even where its very purpose would seem to be to overthrow some of the most cherished traditions of mankind, it speaks with an air of injured innocence of the bigotry of those who demand impossible demonstrations of things, whose sufficient recommendation, we suppose, ought to be that they are astonishingly novel and startling.

Closely allied with this literary finish and ability

comes in an insidious and insensible dogmatism, which tacitly assumes the habitual air of authority so willingly accorded by the popular mind to an acknowledged literary cleverness. Fine writing will ever go far to disguise the deficiencies of ratiocination, and that charm of style which chains admiration and sympathy will enable us easily to bridge over an immense hiatus of proof with a very few isolated facts, and very many plausible *probabilities*. In view of the tone and manner lately assumed in some scientific "lay *sermons*," we can hardly wonder at the following recent declaration from a pulpit: "Dogmatism, which for centuries droned upon the standards of the theological army, has taken flight and perched upon the banners of the scientists, where it is very noisily flapping its wings. The scientists are the dogmatists of our time, while the theologians are faint-hearted and humble. The former know how few are competent to examine their processes and test their conclusions; hence they assert rashly, and do not hesitate to take vast leaps over pure vacancy."* This may seem a little severe, and a rather unsatisfactory example of the alleged "faint-hearted and humble" condition of the theologians; but from the last sentence, we might fancy the preacher had in his mind that specimen of saltatory logic by which Mr. Darwin concludes that the "arboreal animal with pointed ears and a tail," which he figures as the remote ancestor of mankind, had a still further *marsupial* origin.

This dogmatism, almost unavoidable when we come to fill up those long gaps or lacunae in the record of observed facts by a resort to the "Scientific Imagination," has been wittily if not quite fairly hit off by some versifier in recent numbers of *Blackwood's Maga-*

*Rev. J. S. Kidney, before a convention at Albany.

zine, the continual refrain of whose rhapsody is,—very characteristically, when one considers that the subject necessarily transcends all records of human experience,—

"Which nobody can deny." *

Of course, ridicule has no province in questions of strict science; although it has been often freely used by men of science, in scientific controversies; and we find that writers of the school we are reviewing occasionally do not disdain it in their allusions to metaphysics and theology. We are told that "Darwinism" is largely accepted in Germany, as science: but the national habit of regarding all knowledge as in a state of transition, every theory or discovery as but a stepping stone to something else—in short, as Sir William Hamilton would have put it, the habit of looking at truth itself only as a sort of "hunted hare," the sole value of which consists in furnishing the pleasure of the chase—makes the Germans unsparing in ridicule as well as criticism of any gaps they may discover in intellectual reasoning, fond of mere abstract speculation as they are; and no doubt their intellectual and speculative habits, destitute of sentiment, cause them really to enjoy with a keen sense of appreciation,

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* *Blackwood* for May, 1861, and April, 1871. From the latter we give the two stanzas relating to the point just mentioned:

"Our arboreal sire had a pedigree too,
The Marsupial system comes here into view,
So we'll trace him, I think, to a great Kangaroo,
Which nobody can deny.

The Kangaroo's parent, perhaps, was a bird,
But an Ornithorhyncus would not be absurd,
Then to frogs and strange fishes we back are referred,
Which nobody can deny."

the awkward dilemmas, and puzzling situations into which "science" sometimes flounders.*

That these preliminary considerations are not entirely out of place, will be evident to any one who has read Prof. Huxley's essays, and marked the peculiarities of his style toward those who seem to desire the recogni-

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*At a meeting of a Scientific "*Versammlung*," at Frankfort, in 1867, some American visitors give an account of the "convivialities," at which several pieces were sung from a "Scientific Song Book," prepared by Dr. Hoffmann Donner, of the well known Asylum for the Insane near that place.

The following are two or three stanzas from one of them entitled "The Gorilla's Lament."

Ah, woe is me! what have I learnt?
In childhood, by ignorance blest,
I believed, but in vain, that the prize I should gain,
The monarch of monkeys confest.
Now urged by the cursed desire to be wise,
I've gained the rebuke of my vanity,
My development ceased, and has left me a beast,
An unfinished piece of humanity!

Du Chaillu, you first of the gang;
You Darwin, just look out for squalls;
Carl Vogt, through your preaching and wide spreading teaching,
On me all this misery falls.
Well, let me but catch you, knights errant of truth,
All three of you hear what shall hap;
Your fine skulls I'll dash into splinters, and smash
Your developed brains into pap!

One thought alone comforts me still,
And breathes a sweet peace on my woe,
From agonized raving, insatiate craving,
The path of contentment to show.
No ape to humanity ever attained,
I endure it as well as I may,
Not a murmur escapes, for, while men become apes,
A quiet gorilla I'll stay.

tion of a divine Intelligence as continuously acting in the operations of nature. Prof. Huxley also expressly declares that the Baconian method of induction is not adequate for all scientific investigations. He quotes Mr. Mill on the "Deductive Method" to prove that "there are multitudes of scientific inquiries in which the method of pure induction helps the investigator but a very little way." Mr. Mill describes the "deductive method" to be used in connection with the more complex phenomena to which the direct methods of observation and experiment are inapplicable, as consisting of *three* operations: "first, one of direct induction; the second, of ratiocination; and the third, of verification." Prof. Huxley adds: "Now, the conditions which have determined the existence of species are not only exceedingly complex, but so far as the *great majority* of them are concerned, are *necessarily beyond our cognizance.* But what Mr. Darwin has attempted to do is in exact accordance with the rule laid down by Mr. Mill," &c. ["*Lay-Sermons*," p. 263.]

We suppose it would be recognized by most of our readers as obvious, that the term *science*, when used in connection with questions of physics or the study of material nature, carries a very different impression to our minds from that which we derive from the words "metaphysics" or even "ethical science." And this for the very reason, that the subjects and conditions of the latter are hardly within "our cognizance" in the same sense as those of the former are. It has always been the boast of physicists that their specialty is distinguished for the demonstrable certainty of its conclusions, reached as they are by the inductive method: and it is not to be denied that the students of natural science have been rather disposed to disparage the abstract speculations of metaphysics, such as distin-

guished the old philosophers and schoolmen, who were so ardently devoted to the Aristotelian logic of "deduction" as the only instrument of pure reason, and the only certain means of knowledge. Indeed we believe it is a theologian who has furnished the wittiest characterization of the old philosophic methods. "The schoolmen," says old Fuller, "are like the London merchants, who having little space on the ground, *build up a good many stories in height;*" make up in towering speculations what they lack in the substratum of knowledge.

Is it anything like this that the new departure from the inductive method alone is to introduce into modern science? We believe there has been no "development," much less "transmutation" in the instrument of "ratiocination" since the days of Bacon and Descartes, or even of Plato and Aristotle. It may be that psychical or biological investigations will eventually supply us with the "missing link" between physics and metaphysics; but so far as we can see at present, any theory involving such "complex conditions necessarily beyond our cognizance" as renders it dependent almost wholly upon "ratiocination" in regard to "probabilities" and "analogies," must be relegated to that category of abstract subjects, upon which there can only be endless debate, and various "schools," according as men have been able to use their powers of "ratiocination" or imagination.

We smile at the ancient Cosmogonists and the scanty materials they had upon which to carry out their "ratiocination;" but when we enter upon questions involving conditions *necessarily* beyond all human cognizance, and construct our theories where an adequate induction of facts is impossible, are we not following their example into the path of mere abstract speculation? Leaving out the historical Revelation of the fact

of creation—"specific" it must have been, if any—supposing that science alone is sufficient for all things—is it much easier for us to build a world with the "bellows and anvil" of our "ratiocination," than Cicero says it was for the earliest philosophers of Greece? For it is worth while to observe that the first efforts of philosophy were not directed to dealing with abstruse questions of metaphysics alone, but rather to questions of cosmogony and theogony. And we can not resist the temptation to call attention to something of a resemblance between the methods of the ancient and modern cosmogonists. Perhaps there can hardly be a theory on this subject which the former have not touched or approached. Here we can not help sympathizing with the exclamation of Dr. Tayler Lewis, in a paper recently read before the "Convocation" of the University of the State of New York. We continue the extract somewhat beyond the point under discussion, as an argument for that acquaintance with the whole history of human thought which alone can qualify us to judge the bearings of any system or product of science that claims to be new.

Oh, for one like Ralph Cudworth, to beat down the errors of the day as he smote Hobbes, some modernized form of the same intellectual giant to put to silence the Darwinism and Spencerianism of our times, by showing how much more acutely all their speculations in the science-transcending spheres of life, and world-making, were thought out by certain ancient minds, and how thoroughly it was refuted by others—or what a close parallel there was between the old hylozoism and the modern doctrine of protoplasm; or between the infinite "congruities and incongruities," the infinite hits and the infinite misses in infinite time of Democritus, as compared with the same thing now passing under the name of "natural selection!" What a service again would he do who should show how applicable yet are the popular maxims of the ancient legislators, theoretical and practical, to our crude politics. We can barely hint at this. Such a *practical* position occupied by classical men, thus

making a most *practical* use of their studies by bringing them to bear on the questions of the day, would, more than anything else, put to silence the common objection to their inutility. In another aspect it might be said that it would furnish the strongest stimulus to higher excellence in this department of knowledge. This seeking for hidden treasures, with the assurance not only of discovering, but of finding a rich and ready market for its products, would be all that is needed to give the study of the ancient literature the place it deserves in all our higher education.

It is thus advisedly that we speak of a "resemblance," and recall the tendency of human speculations as such to revert to some former type. The earlier cosmogonists like Anaxagoras, as did Plato after him, believed the world to be the work in some manner of an infinite Mind; but the Epicurean philosophy, which became the accepted doctrine with most of the "men of science," as well as the literary and ruling class of the ancient civilization, managed to banish God out of the universe, and traced every thing to the operation of some natural laws, or "forces" as they would now be called,—to the perpetual flux and fortuitous concourse of "atoms." In that remarkable work, "*De Natura Deorum*," Cicero makes a professed disciple of this philosophy thus state some of its principles:

The philosopher (Epicurus) from whom we received all our knowledge hath taught us that the world was made by *Nature;* that there was no occasion for a work-house to frame it in; (or a mind to frame it, as had been said.) And that though you deny the possibility of such a work without divine skill, it is so easy to her, that she has made, does make, and will make innumerable worlds. But because you do not conceive that nature is able to produce such effects without some *rational aid*, you are forced, like the tragic poets, at a loss for a conclusion, to have recourse to a deity (run to a God!) whose assistance you would not seek, if you could view that vast and unbounded magnitude of regions in all parts, where the mind, extending and spreading itself, travels so far and wide that it can find no end, no extremity to stop at. In this immensity of breadth, length and height, an infinite power

of innumerable atoms is in agitation, which, notwithstanding the interposition of a void part of space, meet and cohere, and continue clinging to one another. By this union those modifications and forms of things arise, which in your opinions could not possibly be made without the help of "bellows and anvils." Thus you have imposed on us an *eternal Master*, whom we must dread day and night. For who can be free from fear of a Deity who *foresees, regards* and *animadverts* on every thing: one who *thinks all things His own*— a curious, *ever-busy* God?" [Book i., xx.]

In this extract, one can discern a sort of anticipation of many modern speculations, from the "nebular theory" down to "protoplasm;" but one would hope there are very few who would so openly confess the desire to get rid of the cognizance of an all-seeing and *ever-working* God, as Cicero's Epicurean has done in the last sentence. Epicurus certainly did not venture to deny the existence of a God. The interlocutor in this dialogue, whom we have quoted, is reminded, soon after, that the notion of Gods was so *naturally* and indelibly impressed upon the minds of all men, that any atheist would certainly have been banished from Athens; but Epicurus wished only to put God out of *any relation to or concern with this mundane system of things;* and this, it is maintained also, if not atheism essentially, is at least a destruction of all religion.*

* Every scholar will recall the "*De Rerum Natura*"—in some respects the most remarkable work of classical antiquity, in the majesty and music of its awful creed, by Lucretius, the Poet of the Epicurean philosophy. In marvelously elaborate detail he sings the evolution of all forms out of primordial atoms, and even that "struggle for existence" through the blind pressure and competition of the powers of Nature, which forms the essential principle in the system of Darwin, comes out distinctly in his verse:

> "Multaque tum interiisse animantum secla necesse est
> Nec potuisse propagando procudere prolem.
> Nam, quaecumque vides vesci vitalibus auris
> Aut dolus, aut virtus, aut denique mobilitas, est,
> Ex ineunte aevo, genus id tutata reservant.
> Multaque sunt, nobis ex utilitate sua quae
> Commendata manent, tutelae tradita nostrae."
>
> (*Book V., see the whole context*, 846–875.)

Science, it is said, has nothing to do with consequences: its sole end should doubtless be to ascertain and demonstrate the truth; but any *theory*, involving consequences of the last importance to mankind, so long as it can claim only to be a theory with partial inductions of facts in its favor, must submit to be treated with rigorous scrutiny, must be compelled to reconcile the facts that are inconsistent with it, and must leave no scientific objection unanswered. It can not be said to have established itself until it has done all this: and even then it must be subject to the possibility of that fate which the further progress of scientific investigation has brought, and may bring, to many an accepted theory before it.

Nothing of course is more unfair than to raise moral objections and prejudices against single-minded seekers

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"Many kinds of animal life too must then have perished, not having been able to continue their species by propagation: for whatever creatures you see breathing the vital air, assuredly either craft, or courage, or at least, activity, has preserved their race, defended from the beginning of its existence. And there are many which, from their usefulness to mankind, remain as it were intrusted to us, and committed to our guardianship."—(*Watson's translation.*)

Tennyson has, in describing the suicide of Lucretius, finely entered into the gloomy but sublime spirit of his poetry:

> And therefore now
> Let her that is the womb and tomb of all,
> Great Nature, take, and forcing far apart
> Those *blind beginnings that have made me man*,
> Dash them anew together at her will
> Through all her cycles—into man once more,
> Or bird, or beast, or fish, or opulent flower—
> But till this cosmic order everywhere
> Shattered into one earthquake in one day
> Cracks all to pieces—and that hour perhaps
> Is not so far when momentary man
> Shall seem no more a *something* to himself,
> But he, his hopes and hates, his homes and fanes
> And even his bones long laid within the grave—
> The very sides of the grave itself shall pass
> Vanishing atom and void, atom and void,
> Into the unseen forever.—" &c., &c., &c., —*Lucretius.*

after scientific truth, as respects themselves personally; but surely this principle does not apply to their *theories*, which in point of fact may be materialistic, pantheistic or atheistic, according to their logical results, whatever their propounders intended, if indeed a truly scientific mind can be said to *intend* anything. Locke was a professed Christian himself, while his theory of sensation led to atheistic results. The French have sometimes boasted that their country was always the practical theatre for putting to the test of experiment whatever theories were started in any other part of Europe: and there is demonstrable truth in the assertion that the French Revolution of 1793, was the legitimate result of carrying out to their last expression the principles of the philosophy of Locke.

Much of the language of the recent literature of science implies a certain *theory* in regard to the origin and existence of all things which is just as distinct and positive as the Epicurean philosophy, whether the writers mean it or not, or whether they are willing to acknowledge it or not. Surely those who are accustomed to push an induction of facts to the farthest conclusions it will warrant, ought not to be afraid of admitting the logical meaning of their own use of such expressions as "nature," "force," and "principle of life," for neither of which, by the way, has *science* as yet furnished any satisfactory definition.

It may be said that to remove an intelligent agent out of the present operations of the universe, back to some remote and unimaginable *beginning*, is not denying the existence of a God, but recognizing it; but we must agree not only with what Cicero makes Cotta say of the Epicurean doctrine of God, but also with what a recent Edinburgh Reviewer declares of the real magnitude of the issue involved in the theory of evolution

as presented in Mr. Darwin's system of natural and sexual selection, and applied to mankind:

"If our humanity be merely the natural product of the modified faculties of brutes, most earnest minded men will be compelled to give up those motives by which they have attempted to live noble and virtuous lives, as founded on a mistake: our moral sense will turn out to be a mere developed instinct, identical in kind with that of ants or bees; and the revelation of God to us, and the hope of a future life, pleasurable day dreams invented for the good of society. If these views be true, a revolution in thought is imminent, which will shake society to its very foundations, by destroying the sanctity of the conscience and the religious sense; for sooner or later they must find expression in men's lives." (Descent of Man. *Ed. Rev.*, July, 1871.)

It will not be regarded as going out of our way, if we here submit a compact logical statement in regard to the use of certain terms in scientific language, which goes to show not only the importance of exactness and definiteness of meaning in our use of words, but also the remarkable ulterior results that may sometimes be involved in phraseology that is familiar enough and may appear to be carrying us along the path to new acquisitions. It is taken from a brief monograph by Prof. Wilson, of Cornell University, which we the rather place on record here, as it has appeared only in the columns of a weekly newspaper. We commend it to our scientific readers as a specimen of that kind of test which ought to be applied to the speculations that relate to "complex phenomena, involving conditions necessarily beyond our cognizance," more frequently than it is. The occasion of the article was an attempt of President Hopkins, of Williams College, in a public discourse, to meet and criticise some of the biological views of Prof. Huxley.

Dr. Hopkins says: "Thirty years ago I said in a public discussion that 'the principle of life is one of the great principles of nature,' and 'when we see it acting with the same uniformity

and at times with the same apparent blindness as the other powers of nature, we can neither doubt that it is to be ranked as one of those powers, nor that it is among the greatest and most striking of them.'"

Now in this, President Hopkins is admitting in substance what he denies in special form. He leaves the root of the tree flourishing underground while he lops off one or more of its branches. In fact, philosophy, as thus far presented to the world, seems to me like an immense underground root—*quack grass*, if you choose to call it so—which is continually sending up its shoots, and however diverse in form, or in the location from which they start, have, each one of them, one or another of two kinds of fruit, and two only—*pantheism* and *materialism*—both of which are practically and in the only sensible sense of the word, atheism. ("Atheism" being negative can have only this relative meaning—the denial of God—that is, the One true God.)

For Dr. Hopkins, as indeed for Prof. Huxley, I have the highest regard. Dr. Hopkins needs no praise of mine. He is regarded as one of the cleverest, deepest thinkers, and most forcible writers of the age. In this opinion I fully concur. I think he well deserves the reputation he has acquired.

But I wish to criticise him a little and ask him a few questions:

Does he believe that there is "a principle of life" at all? Can he tell us what it is? give us any proof of its reality? He calls it "a power," "a formative force," and says that of it "we know nothing." Then, of course, we, as men of thought and as speaking truth instead of writing poetry and fable, can say nothing of it, and that of which we can say nothing, and know nothing is, *for us*, nothing.

The word "principle" is used in two senses. In one it is a general term including abstractions, as when we speak of the principles of grammar, of logic, of geology, &c. In the other it is also a general term; but as such it includes a class of things denoted by concrete terms, and which are more commonly called "elements." As the "first principles or elements" of matter.

Now, manifestly, Dr. Hopkins does not mean to use the word "principle" when he speaks of "the principle of life" in the first sense of the word, for principles in that sense are truths. Does he really mean to use the word in the second sense? If so, which of the principles does he mean? Let him tell us precisely, and his doctrine will doubtless become either senseless,—too obviously so to need or allow of refutation, or it will become too obviously true to need proof or admit of denial.

A "principle" is in any view a "first thing." If now we start with the *material* objects around us we arrive, by chemical analysis, at the sixty-four or five principles or elements, oxygen, carbon, iron, &c., &c. Then, proceeding in the direction of synthesis, we have the hundreds of minerals and the scores of organic colloids, &c., and *of these the material world is made up*, every object and reality in it. Each object is a cause and a force. It does something to others around it; it attracts or repels; it heats them or cools them, &c., &c. But "attraction," "heat," and "cold," are but abstract terms. They do not denote things, they are not true causes.

If we start with thought we are led to mind, to one for each thinking being, and hence we have "principles" or first things, and in turn we have "mind" and "body." Nothing else. The body and each of its parts, organs and tissues, lives and grows and decays. Nay, this is true of each cell and even of each molecule in a cell. It lives, grows, developes, &c.

So, too, the mind thinks, *it* perceives, *it* reasons, *it* remembers, &c., &c. But beside and beyond the two—mind and body—there is nothing in man; no reason that reasons; no memory that remembers; no will that chooses; no "principle of life" that developes the form, "breaks up strong cohesions, picks the lock of chemistry, gives the shell in the sea its voluted form," &c. If there is *any* thing besides mind and matter in man, it is God.

For, in the third place, we can start from the phenomena of nature and prove from them, by the closest analysis, that these phenomena, as phenomena of mere inert matter, imply a non-inert, or spontaneous Being, existing before any of the phenomena of matter were possible and as a cause of them, the antecedent condition of their possibility.

And these three are all: God, who is one; Minds, which may be numerous, as it shall please God to make them; and Matter, or rather material things, considered as either (1) chemical elements, or (2) mineralogical compounds, or (3) organic cells and tissues.

Now which of these is "the principle of life?" To which of the three categories of existence does it belong? To the first? then it is God. To the second? then it is a rational, personal agent, *who* is it? To the third? then it is a cognizable substance; it has objective properties, as color, form, density, &c.; it *can have*, if it has not, a specific name. *What* is it?

We can make a fourth category that will be co-ordinate to these three only by abstraction or fancy—some process that does neither

prove nor imply the reality of its objects. We have sense-perception, sight, touch, &c., and this gives us *material* objects: the chemical elements and the mineral and organic compounds. We have consciousness, and this gives us, Mind—each one his own, and thus by generalization, one for each man. We have insight, and this, by analysis, leads us to the cognition of a One who is *above* all else, *before* all else, and *substantially* different and distinct from all else—God over all blessed forever. If He does not exist, then existence is impossible. If they exist, His being and attributes cannot be denied.

But if we would make any other category or class, except by a subdivision of these three, or some one of them, we must proceed by either abstraction or fancy.

(1.) By abstraction and objectification, as, when we see a white object, we speak of "*whiteness*," or an attracting object, and speak of "attraction," a heated object, and speak of "heat," a living object, and speak of "life," or "a principle of life." But these things are not real; they are not *things* at all—they are mere abstractions—objectified abstractions.

(2.) By fancy, we may think and suppose objects like the gods of the heathen mythologies, the monsters of their fables, the elves and fairies of mediæval superstitions. But they are unreal. We have no proof of their existence and no sensible man believes that they exist.

Now to come to the phenomena of life, or rather of living things. What have we? Certain elements,—oxygen, carbon, hydrogen, nitrogen, &c.,—unite in the form of a cell and *live!* Can any one tell how they unite? Perhaps they observe the laws of chemical affinity. But this is mythology again. Perhaps in uniting they attract and repel as they do in forming the crystaline compounds of the inorganic world. But what makes them *live?* Is there a "principle of life" with creative godlike power, that makes these cells living tissues, organic masses, plants, animals and men, to differ from mere inorganic objects in the mode of their existence? If so, let us fall down and worship it; for it is verily the God that made us. We need no other. We can know of no other. We can, truthfully, acknowledge no other. But if not, let us say as I do most emphatically say, God, the Author of Revelation, is the Agent and cause, that makes them to live, and their life is proof of His existence, as much as motion is even proof of a moving cause, as creation itself is proof of a creator.

If now we acknowledge this Agent to be God—the God whom we worship and adore, we are theists. If not, and we call what there is in the phenomenon, matter, we are materialists; if we objectify the abstractions that we can make from what is observed, confounding substance with property and mere mode, we are pantheists, howsoever we may name or misname our pantheism. And in either case, as materialists or pantheists, we are *atheists* in the only real sense of the word. We deny that which alone is God, and as an inevitable consequence we *deify*, that is make a god or something that we shall call one, out of something else. If that something be matter simply, we are materialists; if it be an objectified abstraction, we are pantheists.

But no man is a mere materialist. Even Huxley and all of that school objectify abstractions. They make light and heat so to be "the powers" and "forces" of nature, as Dr. Hopkins does "the principle of life." And the difference is really this: the materialist objectifies the *properties of matter*, as "heat," "light," "electricity," &c., and the pantheist objectifies *thought*, the actions and *states of the mind*, calling them "ideas," and then both alike proceed to make "gods" of the "objects" they have thus made.

Now we touch bottom, and cut up this prolific root of all or nearly all speculative error, when we acknowledge and accept the fundamental principle that in every scientific or didactic statement in anything that is not mere poetry and myth, no abstract term can be made the grammatical nominative to any verb except the simple verb "*is*" or "*are;*" for the moment we make such a use of an abstract term, we objectify the abstraction, make of it a substantial thing, a real cause, "power" or "force," and have admitted a principle by which all the facts and phenomena that men can know, can be explained and accounted for without the recognition of God, or finding any proof of His existence. My principle will be hard on poetry; it will spoil mythology, but I trust it will give us some common-sense, life-giving theology [or other science.]

All mere *theories* then, must be content to be subjected to some such process as this; and any theory relating to the origin of organic beings may possibly involve all the old metaphysical discussions which schoolmen have expanded out of the hints of ancient philosophers, both heathen and Christian, from Thales to Augustine, about *Creatianism* and *Traducianism*, the *Immanence* of Di-

vine Essence in Nature, or that *Transcendence* which supposes the original Maker to have imposed all its qualities upon matter, according to which every thing has gone on from the impulse originally bestowed.

It is sufficient to have barely indicated the variety of logical discussions and results, to which even a theory of the origin of mere animal organisms may give rise, without going further into detail.

Some readers may be disposed to complain, that in connection with a professed notice of the works at the head of our article, we should have referred to the theories of the ancient cosmogonists. We are glad to find that the recent Inaugural Address of Sir William Thomson, President of the British Association of Science, delivered at the late meeting at Edinburg, (Aug. 1, 1871,) which reached us after writing what has gone before, fully bears us out in such reference. He treats this whole subject of evolution as of course included in cosmical physics; and while with Prof. Huxley, not undervaluing the labors of Pasteur and others, he still adheres to Biogenesis "as an article of scientific faith, true through all space and all time, that life proceeds from life and from nothing but life," he also enters a noble protest against that quiet ignoring of a guiding Intelligence in nature and the argument of design, which seems to be too characteristic of the modern scientific theories of Darwin and others. It is refreshing to find that even in the British Association of this day of Advanced Science, the good old arguments of Natural Theology which found scientific statement as far back as the days of Xenophon's *Memorabilia*, are not regarded as wholly obsolete. The passage we refer to is the concluding paragraph of the address, and is as follows:

Darwin concludes his great work on *The Origin of Species* with the following words :—"It is interesting to contemplate an entangled bank clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. * * * There is grandeur in this view of life with its several powers, having been originally breathed by the Creator into a few forms or into one; and that whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms, most beautiful and most wonderful, have been and are being evolved." With the feeling embraced in these two sentences I most cordially sympathize. I have omitted two sentences which come between them, describing briefly the hypothesis of "the origin of species by natural selection," because I have always felt that this hypothesis does not contain the true theory of evolution, if evolution there has been, in biology. Sir John Herschel, in expressing a favorable judgment on the hypothesis of zoological evolution, with, however, some reservation in respect to the origin of man, objected to the doctrine of a natural selection, that it was too like the Laputan method of making books, and that it did not sufficiently take into the account a continually guiding and controlling Intelligence. This seems to me a most valuable and instructive criticism. I feel profoundly convinced that the argument of design has been greatly too much lost sight of in recent zoological speculations. Reaction against the frivolities of teleology, such as are to be found, not rarely, in the notes of the learned commentators on Paley's *Natural Theology*, has, I believe, had a temporary effect in turning attention from the solid and irrefragable argument so well put forward in that excellent old book. But overpoweringly strong proofs of intelligent and benevolent design lie all round us, and if ever perplexities, whether metaphysical or scientific, turn us away from them for a time, they come back upon us with irresistible force, showing to us through nature the influence of a free Will, and teaching us that all living beings depend on one ever-acting Creator and Ruler.

By way of illustrating further the moderate and conservative spirit that appears to have animated this meeting, as to the class of subjects here contemplated,

we add the following passages from the address of Professor Tait, President of Section *A*, embracing the department "of Mathematics and Physical Science."

There must always be wide limits of uncertainty (unless we choose to look upon physics as a necessarily finite science) concerning the exact boundary between the attainable and the unattainable. One herd of ignorant people, with the sole *prestige* of rapidly increasing numbers, and with the adhesion of a few fanatical deserters from the ranks of science, refuse to admit that all the phenomena even of *ordinary dead matter are strictly and exclusively in the domain of physical science.* On the other hand, there is a numerous group, not in the slightest degree entitled to rank as physicists—though in general they assume the proud title of philosophers—who assert that not *merely life, but even volition and consciousness, are mere physical manifestations.* These opposite errors, into neither of which is it possible for a genuine scientific man to fall, so long at least as he retains his reason, are easily seen to be very closely allied. They are both to be attributed to that credulity which is characteristic alike of ignorance and of incapacity. Unfortunately there is no cure—the case is hopeless—for great ignorance almost necessarily presumes incapacity, whether it show itself in the comparatively harmless folly of the spiritualist, or in the pernicious nonsense of the materialist. Alike condemned and contemned, we leave them to their proper fate—oblivion; but still we have to face the question—where to draw the line between that which is physical and that which is utterly beyond physics. And again our answer is—Experience alone can tell us; for experience is our only possible guide. If we attend earnestly and honestly to its teachings, we shall never go far astray. Man has been left to the resources of his intellect for the discovery not merely of physical laws, but of how far he is capable of comprehending them. And our answer to those who denounce our legitimate studies as heretical is simply this—A revelation of any thing which we can discover for ourselves, by studying the ordinary course of nature, would be an absurdity.

He concluded by endorsing the "noble words" of Prof. Stokes at Exeter:

"When from the phenomena of life we pass on to those of mind, we enter a region still more profoundly mysterious. * * * * Science can be expected to do but little to aid us here,

since the instrument of research is itself the object of investigation. It can but enlighten us as to the depth of our ignorance, and lead us to look to a higher aid for that which most nearly concerns our well-being."

There is a mighty difference between this language and the fiercely bitter objurgations of Prof. Huxley against "Bibliolatry" and the "Hebrew Cosmogony," which he shamelessly compares to the "coeval myths" of Osiris, and the life-breeding mud of the Nile. [*Essays*, p. 277.] The British Association will not turn over modern civilization once more to the "sty of Epicurus," or teach that the highest end of the "dust of Alexander" is to "stop a bunghole." After all these ages of historical realities, the human mind is not to be compelled to take up that attitude of despair, pictured by the Poet of our age, only that he may give it its proper answer:

Are God and Nature then at strife,
  That Nature lends such evil dreams,
  So careful of the type she seems,
So careless of the single life.
  * * * And he, shall he,
Man, her last work, who seemed so fair,
  Such splendid purpose in his eyes,
  Who rolled the psalm to wintry skies,
Who built him fanes of fruitless prayer,
Who trusted God was Love indeed,
  And Love Creation's final law,
  Though Nature, red in tooth and claw,
With ravin, shrieked against his creed—
Who loved, who suffered countless ills,
  Who battled for the True, the Just,
  Be blown about the desert dust,
Or sealed within the iron hills?
No more? A monster then, a dream,
  A Discord—Dragons of the prime
  That tare each other in their slime—
Were mellow music matched with him!

The answer is found in the subordination of "Science" to that "Wisdom heavenly of the Soul" which is the motive power of the higher and nobler part of man's nature. Of "Knowledge" it must be said:

> Half grown, as yet a child and vain,
> She cannot fight the fear of death,
> What is she, cut from love and faith,
> But some wild Pallas from the brain
> Of Demons? fiery hot to burst
> All barriers in her onward race
> For power. Let her know her place,
> She is the second, not the first.
> A higher hand must make her mild,
> If all be not in vain, and guide
> Her footsteps moving side by side
> With wisdom, "like the younger child."
>
> —In Memoriam, 54-113.

It is but proper to say here, that not all theories of evolution are liable to the same objections. As we shall see hereafter, Mr. Mivart proposes a theory of evolution which may be otherwise expressed as *derivative creation*, which is quite compatible with—nay, implies, a "guiding Intelligence," and final causes. But any theory which repudiates teleology must demonstrably end in the blank materialism of Lucretius and the Encyclopedists, and put its author into the category of those physicists who assert that not merely life, but even volition and consciousness, are merely physical manifestations—an error, into which, as Professor Tait says, it is "not possible for a genuine scientific man to fall, so long at least as he retains his reason."

Since Mr. Darwin has applied his theory to the origin of man, it becomes more necessary, or at least a matter of greater interest to re-examine his whole system. Many of those who at once embraced his theory of Natural Selection when first propounded, seemed to

suppose as a matter of course, that Mr. Darwin would not venture to include man among the "animals" in this respect; but that he would allow the vast differences between man and all creatures below him to be evidence of some separate origin, or a distinct creation; or at least, that if "community of descent" should be claimed for his bodily nature, yet his moral and intellectual nature, his gift of language, the sense of obligation, freedom of will, and other spiritual qualities would be granted a higher source than development out of a mollusc.

We, however, have never entertained any such expectation. The very nature of Mr. Darwin's theory foreshadowed its application to the human race: and with a perseverance that nothing but a desire for symmetry and universality in a theory can account for, he has embraced in his system not only man's physical constitution, but endeavored to trace all the phenomena of his mind and moral nature to the operation of the same mere physical causes that have developed his body to its present form and functions. He thus sweeps the whole range of psychological as well as physical science, and his system involves hardly less than a cosmogony. It really professes to be a complete Biology, if not as to the *why*, at least as to the *how*, of all organic existence. Thus it is, that this theory calls for the attention, if not the animadversion, of almost every other department of science; and Prof. Huxley must not complain, if even Mathematics and Astronomy seem to so far forget "their own business," as to think of applying some of their crucial tests to this Darwinian theory, especially when it expects to have its enormous drafts on the bank of *time* honored *ad libitum*.*

In the very first edition of his great work, "*The Origin of Species*," after stating his conclusion, that all

* See *North British Rev.* July, 1869. *Geological Time.*

the various forms of animal and vegetable life now living on the globe, or fossilized in its rocks, have come down by natural descent,—"animals from at most four or five progenitors, and plants from an equal or less number,"—he adds this suggestion:

"Analogy would lead me one step further, namely to the belief that *all* animals and plants have descended from some *one* prototype. But analogy may be a deceitful guide. Nevertheless, all living things have much in common in their chemical composition, their germinal vesicles, their cellular structure and their laws of growth and reproduction. * * * I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some *one* primordial form into which life was first breathed by the Creator."

Such is the hint which he has carried out in his last work, "On the Descent of Man:" although in doing so, he has superadded *another* theory, that of "Sexual Selection," the discussion of which occupies the larger portion of the book, and has made sundry modifications and admissions in regard to his former theory of "Natural Selection," which by many are claimed to be *fatal* to his whole system. The introduction of man into the question has obviously very much complicated the whole subject; detracted altogether from the *simplicity* which formed such a powerful recommendation to the original theory, and has imposed upon Mr. Darwin a congeries of hypotheses, which it requires all his vast information and acknowledged acuteness to keep in a state of tolerable consistency with each other. The discovery that the original theory of "Natural Selection" is not *of itself adequate* in its application to man as an animal, seems to us a death blow to it as anything like a full account of the "Origin of Species."

However, reserving this part of the subject to another occasion, we propose in the remainder of this paper briefly to state Mr. Darwin's theory of the Ori-

gin of Species by Natural Selection, and to point out some of the chief objections that apply to it, many of which have been most scientifically formulated by Mr. Mivart, himself a professed evolutionist, and more especially to look at it with reference to its attitude toward teleology and creation. We are aware that a full discussion of these points would require a large volume, rather than a moderate review-article, but our purpose is merely to specify arguments with references to authorities in which some of them are more thoroughly elaborated.

Mr. Darwin's theory may thus be briefly stated:

1. All living beings have a tendency to multiply indefinitely in geometrical progression, thus producing an intense competition or "struggle for existence." Linnaeus says a single annual plant producing but two seeds, would increase to a million in twenty years. A pair of elephants, with but three pairs of young in sixty years, would increase to fifteen millions at the end of the fifth century, &c.

2. The animal and vegetable population of the earth remains nearly stationary, showing immense destruction or consumption of life.

3. Every living being tends to transmit its own nature and characters to its offspring, (the principle of *heredity:*) But,

4. Every individual may show slight *variations* in any direction, without limit, which variations, if *favorable* to the individual, tend to be perpetuated, and, accumulating in the same direction of advantage to the individual, become the derivative origin of incipient *species:* if not favorable, these variations tend to *destroy* the individual, &c.

5. This "transmutation of species" has been going on through "incomprehensibly vast periods of time" in the past,—practically infinite: and it has been a *gradual* and very slow process: Nature does nothing "*per saltum.*"

6. This tendency to the preservation of *favorable* variations, Mr. Darwin calls "*Natural Selection,*" for a reason which he thus states:

"I have called this principle by which each slight variation, if useful, is preserved, by the term of Natural Selection, in order to mark its relation to *man's* power of selection. We have seen that man by selection can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations, given to him by the hand of Nature. But Natural Selection, as we shall hereafter see, is a power incessantly ready for action, and is as immeasurably superior to man's feeble efforts, as the Works of Nature are to those of Art." [Chap. III.]

It is common for writers of Prof. Huxley's school to object to the views of theists and teleologists, that they are mere "anthropomorphism." It seems, however, that an intelligent process of human ingenuity here suggested the proper name for what after all is claimed to be but an unmoral, unintelligent operation of nature. For we entirely agree with Prof. Huxley that Mr. Darwin must mean nothing more by his metaphorical language; even though the Frenchman, M. Flourens, accuses him of "personifying nature;"* and we agree with him, too, that Mr. Darwin's theory is directly opposed to teleology, instead of being compatible with it, as some maintain. For it is perfectly plain, that in Mr. Darwin's view, a "favorable variation" in any individual of a species forms no part of any pre-ordained *plan;* neither does it occur in *order* that such individuals may be preserved and a new species be inaugurated; neither

* "Lay Sermons," p. 314; see also p. 303.

does it arise for the ulterior benefit of any *other* being or person, or even of the individual itself that manifests it. The only statement of the case is, that amid the vast destruction going on in the "struggle for existence," some variations are preserved and continued because they *happen* to be best adapted to come off victorious in the general strife. The few individuals out of the great mass that have hitherto been born, which *happened* to have these advantages, bore up best against the perpetual strain of influences adverse to organized existence. This certainly is not "personifying organization," as M. Flourens has it; neither does it leave room for "design" or intelligence of any kind. It is simply of a piece with the notions of chance—"the infinite hits and misses in infinite time"—of the old Atheistic philosophy.* If "*Natural Election*" could be thrown back, like Calvinism, to a period "before the world began," in the mouth of the Theist it might amount to very much the same thing as saying, that on the whole, the Creator has peopled this earth with the class of inhabitants about the *best adapted to live on it;*

* Mr. Mivart himself in the close of his work, alludes to this character of the views he has been criticising. "Some of these," he says, "seem almost a return to the 'fortuitous concourse of atoms' of Democritus, and even the very theory of Natural Selection itself was in part thought out not hundreds but thousands of years ago. Opponents of Aristotle maintained that by the accidental occurrence of combinations, organisms have been preserved and perpetuated such as final causes, did they exist, *would* have brought about, disadvantageous combinations or variations being speedily exterminated." He quotes as an instance of this, the passage from Aristotle's Physics, thus translated:

"For when the very same combinations happened to be produced which the law of final causes would have called into being, those combinations which proved to be advantageous to the organism were preserved; while those which were not advantageous perished, and still perish like the minotaurs and sphinxes of Empedocles." [Arist. Phys. II., c. 8.]

though whether the inhabitants were made for the earth or the earth for the inhabitants, might as a question of science, still remain an uncertainty!

But, in short, as Huxley justly claims, Darwinism repudiates all notions of *construction* or design in the evolution of organic beings, and admits into the category of causes absolutely nothing but what has a physical basis. According to this notion, if there is order and harmony in the universe, it is because disorder can not exist—chaos can not "survive." Whatever is, is right, or in other words, it is because it could not have been otherwise, not because there is any purpose in it; even though Jonathan Edwards,—perhaps the deepest mind that America has as yet produced, fancied that there was something behind and above it all,—a *virtue* which he defines as "the *Love of Being in general*," which *organizes* system out of chaos, and life out of death.

It will be seen that the definitions or principles of Darwin's theory are so dovetailed together that no one of them can be struck out without destroying the whole. It is *necessary* that the distinction between species and varieties should be done away with, in other words, that species, which Linnaeus declared to be a classification by Nature itself, (*opus Naturæ*) and not, like orders and genera, a fiction of human wit, (*sapientiæ*) should be altogether *abolished*: it is necessary that the principle of variations should be practically *without limits*, in all directions, instead of being confined within a certain sphere around a definite type: it is necessary that the process of accumulating variations should have been slow and gradual, and that the whole space between remote extremes of specific development should be filled up with an unbroken succession of intermediate forms; that there should have been no catastrophes, no "special creation," no leap or *saltus* in natural operations: and

in order to all this, and to meet the objection of any example of these principles not being furnished by the records of the historic period, it is necessary to call in the aid of "incomprehensibly vast periods of past time," as many aeons or ages as the speculations of geological theories at least will allow. If these hypotheses are all established, then the origin of species by Natural Selection is proved: if any one of them fails, the whole theory has no standing point.

Professor Huxley says, that in geological inquiry, "Catastrophism" (Cuvier's theory of the effects of cataclysms and convulsions in former ages) "is the doctrine of the past: Uniformitarianism" (the theory of Hutton and Sir Charles Lyell, that all past operations and changes in Nature have been effected by causes of the same kind and degree that are still at work in Nature) "is the doctrine of the present: Evolutionism," (the theory of cosmic development out of molecular chaos, suggested by Kant and Laplace,) "is to be the doctrine of the *future*." Among the disciples of this new school are ranked Mr. Darwin, Herbert Spencer and Prof. Huxley himself. Evolutionism indeed is not necessarily blind chance, or atheism. "Molecular chaos," must have received or been "endowed with" its organizing force, that determined the end from the beginning, even if we acknowledge not the *continuous* operation of an original Will. Dr. Caird, in a sermon on occasion of the meeting of the British Association at Edinburgh, pointed out very acutely the confusions hanging round the scientific use of that word "law," as against personality and personal agency; when it only requires the attributes of *Infinite perfection* in the Agent, to get rid of the notion of caprice, and to invest his operations with the fixed and unchangeable characters which are expressed to us by the word "*Law*."

But we fear that the "evolutionism" of Huxley and Darwin, in its rejection of final causes as well as guiding intelligence, simply incorporates in itself that "uniformitarianism" of Hutton, which professes to find "no physical evidence of a beginning—no prospect of an end." Both in respect of time and steadily working causes, Mr. Darwin's system is essentially "uniformitarian." Whatever may have been the historical distribution of these three theories, we believe the future will vindicate whatever is sound in either of them, and will not permit any one of them to entirely supplant the rest or to monopolize the scientific world.*

As to the phrase "Natural Selection," when we come to analyze the facts, we find it is no *active* agent itself, notwithstanding what Mr. Darwin metaphorically says of its choice being so much superior to man's, and of its "checking deviations," "developing structure," "acting for the good of each creature," "trying to economize," &c. It is purely negative. It expresses the *result that is left* after certain destructive influences have been at work upon a variety of *accidental* combinations. As a late writer in the Quarterly puts it:

"Natural Selection is superior to human selection. What does this mean? That one is a better exercise of choice than the other? No: it means that whereas human selection is choice, trial and experiment, and may therefore fail, natural selection is secure because it is the favorable result to begin with. In human selection the choice aims at the event: in natural selection the *event makes the choice.* Natural selection endows the woodpecker with its instrument—'a striking instance of adaptation'—*i. e.*, it does not *give* one woodpecker its instrument; it has nothing to do with that; it only kills off another woodpecker who has not got it. * * * We have thus to commute the language of natural selection as fast as we receive it, to drive metaphorically forward and really backward at the same time, and at every moment to transpose by

* See *Ed. Rev.*, April, 1869, and January, 1870.

an understanding and arrangement with ourselves, the cart before the horse, into the natural order of the horse first."—*London Quarterly*, July, 1869. *Argument of Design.*

However, we suppose that in the sense in which Mr. Darwin uses the term, Natural Selection *does* give the one woodpecker its instrument quite as much as it "kills off" the other that is without it: only it is well enough to know what is really meant by this figurative language. Long before Mr. Darwin had put forth his theory, Prof. Owen, in his Comparative Anatomy, had spoken of the causes that operate to the *extinction* of species, the same that Mr. Darwin now applies to the *origin* of species: and Lamarck, one of the original "transmutationists" of modern times, expressed nearly the same thing under the phrase, "conditions of existence." Mr. Herbert Spencer has christened Mr. Darwin's theory with a phrase which has proved widely popular, and which Mr. Darwin adopts in his latest editions, "*survival of the fittest*," which of course means, "the best adapted *to* survive," though the same metaphorical indistinctness attaches to this expression as to most of the language connected with this subject. A writer in the London *Guardian* takes it as synonymous with the "prevalence of the strongest," as the prime constituent of the Darwinian system, taking precedence even of cunning or alimentary fitness; and this he infers from Mr. Darwin's illustrations, such as that of "two canine animals in time of dearth" struggling with each other for food, and the weaker leaving "few or no offspring." He therefore claims that on Mr. Darwin's theory "the present races ought, as a rule, to tower as much *above* the fossil ones in size and power as they now sink below them."

It is not likely, however, that this writer's definition would be fully accepted; or that we should be left to

conclude that nature reflects upon us a principle which, applied to human society, (for it is sought to embrace man in the hypothesis of natural selection,) would bring back the doctrine that "Might makes Right" with more than ante-diluvian force and violence, and wipe out every charitable and benevolent institution that has distinguished Christian civilization from pagan barbarism.

We have said that it is necessary to this theory that the word *species* should be abolished. We are asked to believe that "every species is only a link between *allied* forms," and that species are only varieties, and varieties are species. But *how* allied? Allied in the characters that have heretofore been understood to establish species? We cannot agree that Natural History has by any satisfactory proof arrived at this point yet, although Mr. Darwin says that "naturalists have no golden rule by which to distinguish species and varieties." (P. 281.) We believe that Prof. Owen's declaration is still substantially true, that "*observation* of the actual change of any one species into another, through all the hypothesised transmuting influences, has not yet been recorded;" and it is certainly requiring too much to claim that the deficiency of the historic record in this respect is to be supplied by a speculative filling up of what he admits to be the "imperfection of the Geological record."

Notwithstanding the almost universal triumph of Nominalism in modern philosophy, we rather agree with Agassiz and other eminent naturalists, that the word species does not represent a mere "category of thought," but the Realistic idea of a *common nature*; as we believe that *human nature* is a reality, independently of its embodiment in any particular individual.

But, however this be taken, Mr. Darwin's conception

of various species as only a certain *stage of descent* from some one common ancestor, instead of being a definition to start with, is the very gist of his theory to be proved. This question he has discussed in his late work on "The Variation of Animals and Plants under Domestication," intended as an accessory to his "Origin of Species;" but we cannot see that all the wealth of interesting facts which this work really contains, goes to show anything more than the variability of distinct species under the vigilant care of man, within certain limits, and around a definite type, with a constant and strong tendency to *revert* to that type so soon as the ingenious exercise of man's *artificial* selection is discontinued. And Mr. Darwin admits that animals show vastly greater *plasticity* under the hand of man than in a wild state. How then is it possible to argue for even *greater* results in nature, from what man accomplishes by a rational combination of circumstances which could never be fortuitous or take place of themselves?

Cuvier admitted the variability of species "up to a certain point;" Lamarck maintained the "transmutation" indefinitely by the operation of external causes and by some unknown law of progressive development; what is new in Mr. Darwin's theory is the mode of this development by natural selection; but so far as we can judge, Prof. Owen, Agassiz, and most of our best naturalists, in their observations of variability, have seen no reason to change their conclusion that these variations only run the round of a closed cycle. This ought to fix the definition of a species, as involving the blood relationship of all the individuals of such species, though it cannot be denied that the subject is involved in difficulties. Prof. Huxley gives two definitions, which we should rather take as parts of one; the first,

relating to form or structure, *i. e.*, the *morphological* aspect; the other relating to functional characters, or *physiological.* And it seems to us that in his reasoning upon the subject he lays too much stress upon morphology, to the neglect of physiological considerations. And though Mr. Darwin says, "all living beings have much in common in their chemical composition, their germinal vesicles, their cellular structure, and their laws of growth and reproduction," yet how does this militate against separate origin and specific difference? It only proves them all a part of the same cosmos, and is only what we should expect in the theory of the same creator and the same creation. Because spectrum-analysis shows many of the same elements in the sun and in Aldebaran, must it follow that the one was "evolved" out of the other? Community of elements is a very feeble index to community of descent. And it is a very manifest *petitio principii* to assume that hybridism must go for nothing in determining the question of species. In fact, on one occasion at least, Prof. Huxley is candid enough to acknowledge that "as the evidence stands, it is not absolutely proven that a group of animals, having all the characters exhibited by *species in Nature*, has ever been originated by selection, whether artificial or natural. Groups having the *morphological* character of species, distinct and permanent races in fact, have been so produced over and over again; but there is no positive evidence, at present, that any group of animals has, by variation and selective breeding, given rise to another group which was even in the least degree *infertile* with the first." (*Italics ours.*) He believes "that experiments, conducted by a skillful physiologist, would *very probably* obtain the desired production of mutually more or less infertile breeds from a common stock in a comparatively few

years; but still, as the case stands at present, this 'little rift within the lute' is not to be disguised or overlooked." ["*Lay-Sermons*," p. 295.] It is more than a "little rift;" it prevents Mr. Darwin's hypothesis from as yet assuming the dignity even of a theory. Within the "historic period" at least, hybridism exhibits a distinct barrier between species. Prof. Owen in his "Classification of Mammalia" refers to the history of the dog, from the earliest records of Egypt, a period of over 4,000 years, and the innumerable experiments to which that animal has been subjected, as to different degrees of exercise, difference in food, and association with man, no domestic animal showing so great a range of variety in size, color, character of hair, form of head, proportion of cranium and face, &c., and then adds:

"Yet, under the extremest mask of variety so superinduced, the naturalist detects in the dental formula and in the construction of the cranium, the unmistakable generic and specific characters of the *canis familiaris*. Note also how unerringly and plainly the extremest varieties of the dog-kind recognize their own specific relationship. How differently does the giant Newfoundland behave to the dwarf pug on a casual rencontre from the way in which either of them would treat a jackal, a wolf, or a fox. The dumb animal might teach the philosopher that unity of kind or of species is discoverable under the strangest mask of variation."

Notwithstanding Prof. Huxley's plain admission in regard to the non-production of varieties as yet mutually infertile, it appears that some ten years ago, in a "Lecture on Species and Races and their Origin," which does not appear in this volume of "Lay-Sermons" but was printed in the Journal of the Royal Institution,* he put two diagrams before his audience, one connecting the four varieties of pigeon, the Tumbler, the Runt, the Pouter and the Fantail, as descended from a common ancestor, the Rock pigeon, or *Columba Livia:*

* Cited in *Edinburgh Review*, 1860.

and the other connecting the four species, the Horse, the Tapir, the Rhinoceros and the Hyrax or Coney, as *probably* descended from the fossil *palaeo-therium*, though by a vastly longer process than it took to produce the varieties of pigeons. The authority we refer to points out, at a length we cannot follow, how the Professor exaggerated resemblances and glossed over discrepancies of structure; but was obliged to confess that his parallel broke down at the physiological test of hybridism. The writer adds that the real parallel would have been, "Racer, Dray-horse, Barb, Galloway, from the common stock *Equus Caballus*;" for these, like the varieties of the pigeons, are not only morphologically, but physiologically alike: with parallel differences in size, color, caudal vertebræ, tegumentary appendages, relative length of limb, &c. &c.

It is, in fact, the grossest assumption to argue from the results of artificial selection to establish natural selection. They may be shown to be the very antipodes of each other. Artificial selection implies an actual *prevention* of what would otherwise inevitably take place if the animals were left in a state of nature. A favorable variation must be *guarded* against the preponderating influence of the great mass to merge the peculiarity in the natural type. Besides, these variations of artificial selection are hardly ever favorable to the animals as such, do not improve the typical character of the animal as an animal: they are rather in the nature of forced diversions of a type to the artificial purposes of man, and not the benefit of the animal itself—that is, they are really *monstrosities* in the light of nature and compared with the real norm of the species, which nature when left to herself is ever seeking to restore. And in general, whatever advantage is developed in some one quality for the benefit of man is at

the expense of some other quality equally or more important to the animal itself, as regards its preservation in a state of nature. Professor Huxley, indeed, seems to regard monstrosities and sports of nature as in the ordinary line of regular development of new species; though he cannot but admit that his argument from the "Ancon" sheep and such things as the occasional appearance of six-fingered individuals among mankind, is in direct opposition to the principle upon which Mr. Darwin proceeds, that nature is uniform in progress and makes no leaps. [*Lay Sermons*, p. 295.] His reason why the Ancon variety did not become permanent is inadequate, while his remark, intended to explain why the six-fingered family reverted to the usual pentadactyle type, to wit: that "they were too far removed from the patriarchal times to intermarry with sisters," seems too much like scientific trifling.

There can be no doubt that this subject of variability presents many questions which must be left to further scientific research; the evidence so far by no means justifies the claim that Natural Selection meets the case; but, as Mr. Mivart clearly shows, there are modes and conditions of organic action of which the Darwinian theory takes no account whatever.

If Natural Selection began with primordial forms and developed them into new species constantly varying and advancing, how are we to suppose that *any* of the progeny of primordial forms should have escaped the effects of surrounding influences, which constitute that natural selection? Why do we not find *all* present organic forms very complex and superior to the primordial simplicity? Why are the protozoa still the most numerous of all? Why do we find every grade of structure, from the most simple to the most complex, now in existence? How can these facts be reconciled

with the hypothesis of *one* only primordial form, the parent of all subsequent living beings? And why do we find, too, a large tract of the globe, like New Zealand, that has its ascidians and lower forms of life, and yet exhibits nothing higher in the mammals than a simple rodent like the field rat? We are required to believe that a few individual peculiarities are selected and preserved through all adverse influences, against what we know of the law of fertility, and that accumulations of favorable variations are slowly concentred by direct lines through a thousand generations into one new species;—in other words, as a matter of fact, that each new species is the result of myriad *fortuitous* combinations through immeasurable periods of time.

A writer in the *North British Review* of June, 1867, presents some unanswerable considerations on this subject. He shows that even the skill of artificial selection is confronted with positive limits, soon reached in any direction. He thinks that for any one to say, that "if six or sixty years can make a pouter out of a common pigeon, six myriads may change a pigeon to something like a thrush, seems no more accurate than to say, because a cannon ball has traversed a mile in a minute, *therefore* in an hour it will be sixty miles off, and in the course of ages will reach the fixed stars." His idea of this variability is, that

"A given animal or plant appears to be contained, as it were, within a *sphere* of variation: one individual lies near one portion of the surface; another individual of the same species near another part of the surface; the average animal at the centre. Any individual may produce descendants varying in any direction, but is more likely to produce descendants varying toward the *centre* of the sphere, and the variations in *that* direction will be greater in amount than those toward the surface."

Facts fully bear this out. But Mr. Darwin says,—"The struggle between natural selection on the one

hand, and the tendency to reversion and variability on the other, will, in the course of time, *cease*, and that the most abnormally developed organs may be made constant, I *can see no reason* to doubt." He certainly gives no good reason to believe it. It is easier for man's selection to *diminish* peculiarities, that is, to fall in with the tendency to reversion, than it is to increase them; and what prevents it being equally so with nature?

Again, an individual may show an advantage, but that does not raise the whole species; it is necessary that a very large number of individuals should suddenly show the same advantageous peculiarity at the same time, to stand any chance of survival; and if at the same time, some other *hostile* species should be similarly favored, natural selection would be tending to a "war of Titans from a war of pigmies." But in the case of a few individuals only developing the peculiarity, the advantage would be utterly out-balanced by numerical inferiority. As the same writer says:

"A million creatures are born; ten thousand survive to produce offspring. *One* of the million has twice as good a chance as any other of surviving; but the chances are *fifty to one* against the gifted individual being one of the hundred survivors. No doubt the chances are twice as great against any one other individual, but this does not prevent their being enormously in favor of *some* average individual."

Of course the chances of the *progeny* of a "sport," being usually intermediate between the sport and the average, would be still less than those of their parent. This writer enters into an arithmetical calculation by which he shows how numbers may offset any advantage in structure, and concludes:

"As the numbers of the favored variety diminish, so must its relative advantage increase, if the chance of its existence is to surpass the chance of its extinction, until hardly any conceivable

advantage would enable the descendants of a single pair to exterminate the descendants of many thousands, if they and their descendants are supposed to breed freely with the inferior variety, and so gradually lose their ascendancy. If it is impossible that any sport or accidental variation in a single individual, however favorable to life, should be preserved and transmitted by natural selection, still less can slight and imperceptible variations, occurring in single individuals, be garnered up and transmitted to continually increasing numbers."

Mr. Darwin, in his last edition, refers to this argument in a way that indicates his consciousness of its great force. He says:

"Until reading an able and valuable article in the *North British Review*, (1867,) I did not appreciate how rarely single variations, whether slight or strongly marked, could be perpetuated. * * * The justice of these remarks cannot, I think, be disputed. If, for instance, a bird of some kind could procure its food more easily by having its beak curved, and if one were born with its beak strongly curved, and which consequently flourished, nevertheless there would be a very poor chance of this one individual perpetuating its kind to the exclusion of the common form; but there can hardly be a doubt, *judging by what we see taking place under domestication*, that this result would follow from the preservation during many generations of a *large number* of individuals with more or less curved beaks, and from the destruction of a still larger number with the straightest beaks." (p. 94.)

But the question is *how to get* this "large number" out of an individual variation; and if he then says the variation, instead of being eccentric, must be such as is manifested at once in a prevailing proportion of the species, this would be equivalent to abandoning more than half if not the whole field before covered by his theory. "In his work on the Descent of Man," he has made other and more serious admissions and modifications of his previous positions.

We find that we have left ourselves too little space to go into the question of Geological evidence, or to do

justice to the work of Mr. Mivart on the "Genesis of Species."

Mr. Darwin justly says that the geological record is imperfect; but certainly, it is not so imperfect that it ought not to furnish overwhelming proof of his hypothesis if it be true. There are certainly instances enough of successive fossiliferous formations regularly superimposed upon each other to exhibit some of those innumerable intermediate forms which he claims to have existed between known species. Where does Geology give evidence of transmutations during any one period, however long that period is supposed to have been? Prof. Owen, in his "Palaeontology," says, "Every known fossil belongs to some one or other of the existing classes, and the organic remains of the most ancient fossiliferous strata do not indicate or suggest that any earlier and different group of beings remains to be discovered, or has been irretrievably lost in the universal metamorphism of the oldest rocks." Prof. Agassiz has declared that "between two successive geological periods, changes have taken place among plants and animals. But none of these primordial forms of life which naturalists call species are known to have changed during any of these periods." (*Contrib. to Nat. History.*) The polypes that are said to have been 30,000 years in building up the reefs of Florida have not changed a particle; and one of the latest writers on this subject* says:

"In the remote carboniferous epoch the insects that haunted the fern groves and sigillaria swamps were still of forms that can in some cases be classed in existing families, such as cockroaches, crickets, white ants, and such extremely specialized forms of beetles as curculionidae and scarabaeidae! If the development theory be true, these facts compel us to the conclusion that the ages since

*Quart. Rev., April, 1869.

the carboniferous formation, vast though they are, can only be a small fraction of the whole period during which these complicated forms have been slowly evolved from the simpler Annulosa."

Reptiles, it seems, have now got down to this same formation, and fishes to the Upper Silurian.

But if Geology can spare unlimited time, it does not follow that Astronomy can allow the claim. Mr. Darwin asks for 300,000,000 years since the latter part of the Secondary period. Sir Wm. Thomson, in reviewing some of these theories of Geological Time, has, to our mind, utterly demolished the doctrine of Uniformitarianism, and shown by the nicest mathematical calculations, from the underground temperature of the earth, from tidal retardation of the earth's rotation, and from the nature of the sun's action and the dissipation of heat, that the present system has had a definite period of operation and is hastening to a *catastrophe.** Notwithstanding what is said of recent discoveries of low forms of life *below* what have been regarded as Primary and Azoic rocks, yet we do not see how Mr. Darwin can possibly account for the absence of his intermediate links except on the theory of catastrophism; and if the igneous and metamorphic formations teach anything, they confirm the Astronomic demonstration that the world was once a molten mass; that the earth was once, what the eminent Helmholtz maintains the sun is now—a *hot body cooling.*†

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*Geological Dynamics, Reply to Huxley. Trans. Geolog. Soc., Glasgow, 1869. See *North Brit. Rev.*, July, 1869.

† What are the changes of so-called "geological climates" and the interposition of the *glacial* epochs of the Eocene, Miocene, and Pliocene formations, but evidences of Catastrophism? They were catastrophes to species at least, and to gradual evolution. Even uniformitarians say that the present climate of the globe, especially in the Northern hemisphere, is *abnormal*, and allow that there must

Of course, we cannot go into details here. The subject may be said to be *sub lite*; but from all appearance, this school of Evolutionists are likely to find the necessity of somewhat shortening their indefinite processes, and of admitting that some causes have wrought on a grander scale formerly than now, as well as the possibility of future events that shall terminate the present order of things.‡ It is of course not surprising, in view of such questions and difficulties—such gaps in the desired proofs—that we should find the language of doubt or of assumption scattered throughout Mr. Darwin's work in such expressions, frequently repeated, as, "I see no difficulty in supposing," "I can hardly doubt," "there seems no great difficulty in believing," &c., &c. To be sure, such language is hardly Baconian, but then we have been reminded in the outset that the subject presents "complex phenomena, the conditions of which are necessarily beyond our cognizance."‖

have been once a different distribution of land and water. Dr. Gunther has corrected Huxley's statement that the organisms on opposite sides of the Isthmus of Panama were entirely different, by showing that 57 at least out of the 173 known species are identical. So far as the inhabitants of the globe are concerned, it makes no difference *how* climatic changes are produced—it is catastrophism to them.

‡ See *North Brit. Rev.*, July, 1869.

‖ As an instance of rather hasty induction and an over-readiness to believe, we find that the following passage appears in his first edition:

"In North America the black bear was seen by Hearne swimming for hours with widely open mouth, thus catching, like a whale, insects in the water. Even in so extreme a case as this, if the supply of insects were constant, and if better adapted competitors did not already exist in the country, *I can see no difficulty* in a race of bears being rendered, by natural selection, more and more aquatic in their structure and habits, with larger and larger mouths, till a creature was produced as monstrous as a whale." (!)

Buffon would have probably called this a *descending* scale, not an *ascending*. In his last edition, only the *first* sentence of this extraordinary passage appears, to what purpose it is not easy to see.

That being the case, we should take leave to say that Mr. Darwin's work can hardly get beyond the conditions of an unverifiable hypothesis.

Mr. Mivart, in his able and satisfactory treatise, presents in detail objections, more incisive and scientific perhaps, than those we have thus far indicated, to the theory of Natural Selection as an exclusive and adequate theory. He finds it utterly defective in the question of incipient stages of variations, of closely similar structures of acknowledged *diverse* origin, of sudden leaps of nature, of the limits of variability, of the absence of transitional links, of physiological differences, and geographical distribution. We cannot reproduce them here, and we regret it the less as we would wish our readers to possess themselves of what we can recommend as the best resumé of modern views on the subject of the *Genesis of Species.* His own theory of Evolution is an attempt to harmonize the three conceptions of the organic world which are termed the Teleological, the Typical, and the Transmutationist. The facts which Darwinism has appropriated, it interprets in a different spirit, throws out the *fortuitous* element altogether, and substitutes the continuous operation of a Divine Will and Intelligence in a system of what might be called *derivative creation.* He finds also a surprising amount of testimony in favor of this view among early Christian philosophers. His chapter on Theology and Evolution is a very remarkable one, and deserves an article to itself. Much of it will come in play in our future consideration of Mr. Darwin's application of his theory to the question of the origin of man, which, as already intimated, must be postponed to a separate paper. Mr. Mivart would indeed, with a praiseworthy amiability, like to reconcile even the special Darwinian form of the theory of Evolution with Theistic views of

organic existence; but this we think is not practicable so long as an essential feature of that theory is the denial of final causes. But Mr. Mivart's answer to Herbert Spencer's dictum that "the ultimate Cause of things"—the "Inscrutable Power manifested to us through all phenomena" is "*unknowable*" or "transcends Intuition" is every way admirable, and a complete vindication of our intuitions. As Mr. James Martineau points out, to say that God is unknowable, is to say not only that we can know nothing of Him, but also that he cannot reveal Himself to us; or in other words, that "He is a Being that may exist out of knowledge, but is precluded from entering within the sphere of knowledge." As we said at the outset, such views of the relation between Nature and her first cause, are but a rehabilitation of the ancient Epicureanism which sought to banish Deity from the universe.

It remains but to add a few words upon the aspect of Mr. Darwin's system as regards "teleology," or the doctrine of final causes.

He does, indeed, in one place speak of the "laws impressed upon matter by the Creator," and of life as having been "originally breathed by the Creator into a few forms or into one." (p. 436.) Why then does he object to such expressions as the "plan of creation" and "unity of design?" Is it because, tracing back living forms to a period "long before the Silurian epoch," he thinks "we may look with some confidence to a future of inappreciable length?" And although on the same page, Mr. Darwin says, "as natural selection works solely by and for the good of each being [not of any *other* being] all corporeal and mental endowments will tend to progress toward perfection," yet Prof. Huxley, in order to *vindicate* Mr. Darwin from the charge of teleology brought against him by a German critic,

quotes the following passage, which we do not pretend to reconcile with the former:

"The foregoing remarks lead me to say a few words on the protest lately made by some naturalists against the utilitarian doctrine that every detail of structure has been produced for the good of its possessor. They believe that very many structures have been created for beauty in the eyes of man, or for mere variety. This doctrine, if true, would be absolutely fatal to my theory—yet I fully admit that many structures are of no direct use to their possessor."

Now, if this be so, then the doctrine of final causes, or of any purpose extending *beyond* the good of the "possessor," would be equally fatal to his theory. And hence, as before intimated, we agree with Prof. Huxley when he says:

"There is not a phrase in the 'Origin of Species' inconsistent with Prof. Kölliker's position, that varieties arise irrespectively of the notion of purpose, or utility, according to general laws of Nature, and may be either useful, or hurtful, or indifferent." [*Lay Sermons*, p. 305.]

We think, however, that in a matter of so great importance as this, Mr. Darwin should leave no ground for uncertainty. As we have seen, Sir William Thomson agrees with Prof. Huxley in interpreting Mr. Darwin's theory as altogether repudiating the "argument of design." And as we shall hereafter see, this impression is confirmed by the manner in which, in his latest work, he has treated the subject of psychology. What Mr. Mivart's position is, in his own modified theory of Evolution, may be seen from the following words:

"Surely the evidence from] physical facts agrees well with the overruling, concurrent action of God in the order of nature; which is no miraculous action, but the operation of laws which owe their foundation, institution, and *maintenance*, to an omniscient creator of whose intelligence our own is a feeble adumbration, inasmuch as it is created in the 'image and likeness' of its Maker." (*Genesis of Species*, p. 294.)

No scientific Theist could ask more than this, unless, indeed, we might add those words of the immortal Newton, which seem especially inspired to guard against that barren and narrow unbelief which is too often associated with the phrase, "Immutability of Nature:"

"Deum esse ens summe perfectum concedunt omnes. Entis autem summe perfecti Idea est, ut sit substantia una, simplex, indivisibilis, viva et vivifica, ubique semper necessario existens, summe intelligens omnia, libere volens bona, voluntate efficiens possibilia, effectibus nobilioribus similitudinem propriam, quantum fieri potest, communicans, omnia in se continens, tanquam eorum principium et locus, omnia per praesentiam substantialem cernens et regens, et cum rebus omnibus, secundum leges accuratas, ut naturae totius fundamentum et causa constanter cooperans, *nisi ubi aliter agere bonum est.*" (*Brewster's Life of Newton.*)

The last clause of this truly scientific creed saves all the authenticated facts of human history, and all the great verities of the Christian Faith! And we can but wish that writers of the new school would refer more frequently to Sir Isaac Newton, that master builder of science under the Baconian philosophy, of whom we may still say that he is the real father of our latest great discoveries that have revealed to us even the elemental constitution of the heavenly bodies!

Apart from the question of Mr. Darwin's attitude toward Teleology, the argument of design itself, which has been stigmatized as "mere anthropomorphism," would be best considered with those questions of psychology which are raised by his work on the "Descent of Man." It may be well enough to ask—"*what is* anthropomorphism?"—so long as any interpretation of nature given by "science" must be the product of human reason. Has science found in material nature itself any higher or more perfect instrument of philosophic analysis than the animal which science itself

allows to be the highest of all organisms—the intellect of *man* as applied to the questions of the *nature and reason* of things? Perhaps, however, man has sunk into the category of mere *phenomena*—the "effect of a cause"—and is therefore incompetent to pronounce upon the endless chain of which he is but a helpless and irresponsible link! But these considerations must be postponed for the present.

We have not noticed the difficulties which the eminent naturalist, Mr. Wallace, who has supplied a very large proportion of the facts upon which the Darwinian hypothesis relies, has found in the way of "Natural Selection" as a complete or adequate theory of the origin of species;* because they are partly noticed by Mr. Mivart, and mostly relate to the application of the theory to the origin of Man.

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*Contributions to the Theory of Natural Selection by Alfred Russel Wallace. Macmillan & Co., London, 1870. One of these essays, "Limits of Natural Selection as applied to Man," is given in Littell's Living Age," No. 1410, (June 10, 1871,) a valuable serial published at Boston, which reprints much of the best foreign literature on scientific and other subjects.

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THEORIES OF EVOLUTION—No. II.

The Descent of Man and Selection in Relation to Sex. By CHAS. DARWIN, M. A., F. R. S., etc. In two vols. New York: D. Appleton & Co. 1871.

On the Genesis of Species. By ST. GEORGE MIVART, F. R. S. New York: D. Appleton & Co. 1871.

Lay Sermons, Addresses and Reviews. By THOS. HENRY HUXLEY, LL. D., F. R. S. D. Appleton & Co. 1870.

Mr. Darwin appears to have discovered, with Aristotle, that "man is an animal"—belongs to the animal kingdom; and has certain homologies with all other organized forms of being. By the application of his hypothesis of "Natural Selection," by which he accounts for the origin of species with all their varieties and races in the animal and vegetable world, after having subjected it to certain serious modifications and supplementary agencies principally under the head of "Sexual Selection," he seeks to convince us also that Man is *nothing but* an animal, developed like all other species, by insensible gradations, out of the lowest rudimentary forms of living organism: in fact, that man has nothing about him which entitles him to stand apart as a "kingdom by himself." We shall first let Mr. Darwin state, in his own language, the conclusion to which he be-

lieves his investigations, certainly ranging over a vast field and dealing with an array of facts, which, though multitudinous in one view, really bear no proportion to the vastness of that field, have brought him. In the conclusion of his sixth chapter, on "Affinities and Genealogy," he says:

The most ancient progenitors in the kingdom of the Vertebrata, at which we are enabled to obtain an obscure glance, *apparently* consisted of a group of marine animals, resembling the larvae of existing Ascidians. These animals *probably* gave rise to a group of fishes, as lowly organized as the lancelet; and from these the Ganoids, and other fishes like the Lepidosiren, must have been developed. From such fish a very small advance *would* carry us on to the amphibians. We have seen that birds and reptiles were once intimately connected together: and the Monotremata now, in a slight degree, connect mammals with reptiles. *But no one can at present say* by what line of descent the three higher and related classes, namely, mammals, birds and reptiles, were derived from either of the two lower vertebrate classes, namely, amphibians and fishes. In the class of mammals the steps are *not difficult to conceive* which led from the ancient Monotremata to the ancient Marsupials: and from these to the early progenitors of the placental mammals. We may thus ascend to the Lemuridae: and the interval is not wide from these to the Simiadae. The Simiadae then branched off into two great stems, the New World and Old World monkeys: and from the latter, at a remote period, Man, the wonder and glory of the universe, proceeded. Thus we have given to man a pedigree of prodigious length, but not, it may be said, of noble quality. * * * * If any single link in this chain had never existed, man would not have been exactly what he now is. *Unless we wilfully* close our eyes, we may, with our present knowledge, approximately recognize our parentage; nor need we feel ashamed of it. Vol. I, chap. vi., p. 204.

Again, in the conclusion of the whole work:

By considering the embryological structure of man—the homologies which he presents with the lower animals—the rudiments which he retains—and the reversions to which he is liable, we can partly recall in imagination the former condition of our early progenitors: and can approximately place them in their proper position in the zoölogical series. We thus learn that man is descend-

ed from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in his habits, and an inhabitant of the Old World. This creature, if its whole structure had been examined by a naturalist, would have been classed among the Quadrumana, as surely as would the common and still more ancient progenitor of the Old and New World monkeys. The Quadrumana and all the higher mammals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from some fish-like animal.

In the dim obscurity of the past *we can see* that the early progenitor of all the Vertebrata *must have been* an aquatic animal, provided with branchiae, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed. This animal *seems* to have been more like the larvae of our existing marine Ascidians than any other known form. (Vol. II, p. 372.)

Doubtless this conclusion is stated with as much definiteness and precision as the subject admits of: but the process of the argument exhibits many more striking instances of a tentative, hypothetical or suppositive phraseology than those we have italicized in the above extracts.

What obligation of pure science called for the following remark on the last page of his work, it is difficult for us to imagine. Such words seem rather an appeal to faith in an *opinion*, than a demand of intellectual assent to an established scientific proposition:

For my own part, I would as soon be descended from that heroic little monkey, who braved his dreaded enemy in order to save the life of his keeper: or from that old baboon who, descending from the mountains, carried away in triumph his young comrade from a crowd of astonished dogs—*as from* a savage who delights to torture his enemies, offers up bloody sacrifices, practises infanticide without remorse, treats his wives like slaves, knows no decency, and is haunted by the grossest superstitions.

To this eloquent extract, at which even higher organisms than "dogs" might be "astonished," we suppose

that no logician would think of appending the usual conclusive formula, "*Quod erat demonstrandum*," although there could certainly be no objection to the more familiar comment in such cases—"*De gustibus nil disputandum.*" But whatever may be his preference, it would seem there is no alternative: the bloody savage, according to the theory, *comes between* the monkey and Mr. Darwin.

To show still further the perfect confidence, spiced with some dogmatism, which Mr. Darwin appears to have in his conclusions, we cite one more passage, to be found at the close of his first chapter:

> Thus we can understand how it has come to pass that man, and all other vertebrate animals, have been constructed on the same general model, why they pass through the same early stages of development, and why they retain certain rudiments in common. *Consequently we ought frankly to admit* their community of descent: to take any other view, is to admit, that our own structure, and that of all the animals around us, is a mere *snare laid* to entrap our judgment. This conclusion is greatly strengthened, if we look to the members of the whole animal series and consider the evidence derived from their affinities or classification, their geographical distribution, and geological succession. It is *only* our natural prejudice, and that arrogance which made our forefathers declare that they were descended from demi-gods, which lead us to demur to this conclusion. But the time will before long come when it will be thought wonderful that naturalists, who were well acquainted with the comparative structure and development of man and other mammals, should have believed that each was the work of a separate act of creation. Vol. I, p. 32.

It is evident that Mr. Darwin considers every person who is not converted to his theory of the origin of species by Natural Selection as necessarily a believer in a separate act of special creation for all the species and races of living beings. In his "Origin of Species" he allowed "a few" original forms: he now insists upon only one: and recognizes no modes of evolution

per saltum, or by special manifestation, or other than what is consistent with the slow, gradual processes of Natural Selection, aided or supplemented to some extent by Sexual Selection. We will not say that his book must stand or fall with the doctrine of Natural Selection: for we can not admit that even if a Law of natural selection were fully established in the Animal kingdom it would be sufficient to account for the origin of species, much less furnish us with a real anthropology. The theory of Natural Selection has been before the world ten years, before its application to the question of Man's genealogy. But so far from gaining any accession of strength from continued investigations, it has been constantly losing ground, so far as it pretends to be anything like a complete account of the development of animal life. Mr. Wallace, who is certainly entitled to equal credit with Mr. Darwin as an original propounder of this theory, has pointed out many facts and phenomena utterly irreconcilable with it: and Mr. Darwin, in the work before us, makes admissions which can not but be regarded as fatal to it. It is true, that in the passages we have cited, as well as in several others not less significant, Mr. Darwin seems to consider that science is bound to have *some* theory: and a sort of threat is thrown out to us, "accept this or none." *Not* to accept it, is to admit that the whole scheme of things around us is a "mere snare laid to entrap our judgment." "Laid" by whom or by what? And yet the attitude assumed by Mr. Darwin and his school toward teleology, or the apparent system of final causes, which they relegate to mere "anthropomorphism," is simply equivalent to just this position, that all the marks of *design*, of which all nature is full, *are* a "mere snare *laid* to entrap our judgment." *This* hypothesis or *none:* for it is necessary that we should have *some* hypothesis!

Talleyrand, to a person excusing himself for some fault by remarking, "One *must live*, you know," is said to have replied, "*Je ne sais pas la necessite.*" Is it absolutely necessary that science should now claim to have already arrived at a complete cosmogony: and that too on the basis of an array of facts but partially classified, which, however numerous, are really but as a few drops to the great ocean of unexplored truth? The world is already built, and can stand without any artificial scaffolding of our own construction.

No philosophical proposition was ever advanced of wider scope both as to space and time than the theory of Natural Selection: none for which more was claimed, as completely meeting and covering all known facts. It is simply turning out to be inadequate in a thousand directions. In the "Origin of Species" Mr. Darwin says, "Natural selection can act only by taking advantage of slight successive variations; she can never take a leap, but must advance by short and slow steps," and "if it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous successive slight modifications, my theory would absolutely break down."

Moreover, details of structure must have been of special use to ancestral forms, or to the forms of their descendants: and "if it could be proved that any part of the structure of any one species had been formed for the exclusive good of another species, it would annihilate my theory, for such could not have been produced through natural selection."

But nothing is better demonstrated than that Nature does make leaps, as Professor Huxley admits in those very instances brought forward to show how species may originate from indefinite variability: as in the case of the Ancon sheep and the Kelleia family: (Lay Ser-

mons, p. 268, 297,) where also the fallacy of reasoning from domestic breeding to species in nature is recognized: to say nothing of the fact that the phenomena of hybridism which go to show the existence of some unknown limit of variation, confining it to certain spheres round definite types, are as good as ignored, or quietly assumed to be of no significance. Mr. Mivart gives abundant examples of development *per saltum* in his fourth chapter.

And as for the existence of "any complex organ which could not possibly have been formed by numerous, successive, slight modifications," out of the several illustrations which Mr. Mivart, in his chapter on "Incipient structures," has given of such complex organs, we will take the following, which we think our readers will agree, "almost amounts to a demonstration."

The mode of formation of both the eye and the ear of the highest animals is such that, if it is (as most Darwinians assert processes of development to be) a record of the actual steps by which such structures were first evolved in antecedent forms, it almost amounts to a demonstration that those steps were never produced by "Natural selection." The eye is formed by a simultaneous and corresponding ingrowth of one part and outgrowth of another. The skin in front of the future eye becomes depressed, the depression increases and assumes the form of a sac, which changes into the aqueous humor and lens. An outgrowth of brain substance, on the other hand, forms the retina, while a third process is a lateral ingrowth of connective tissue, which afterward changes into the vitreous humor of the eye. The internal ear is formed by an involution of the integument, and not by an outgrowth of the brain. But tissue, in connection with it, becomes in part changed, thus forming the auditory nerve, which places the tegumentary sac in direct communication with the brain itself. Now these complex and simultaneous coördinations could never have been produced by infinitesimal beginnings, since, *until so far developed as to effect the requisite functions*, they are useless."

He cites Mr. Murphy as making a calculation which shows the improbabilities of natural selection in this

case to be about as great as those of evolving a poem and a mathematical proposition by shaking out letters from a box.

We shall see that so far as the question of man's genealogy is concerned, Mr. Wallace has found many facts still further inexplicable on the hypothesis of natural selection. Some of these difficulties are recognized by Mr. Darwin in the work before us. He admits now that in his "Origin of Species" he "attributed too much to the action of natural selection or the survival of the fittest." "I had not formerly," he adds, "sufficiently considered the existence of many structures which appear to be as far as we can judge, *neither beneficial* nor *injurious:* and this I believe to be one of the greatest oversights as yet detected in my work." (Vol. I, p. 146.) And for this he gives the rather strange excuse, that he had been misled by the object predominant in his mind, and perhaps too much occupying his attention, of overthrowing the *dogma* of separate creations! He sees clearly enough on his former theory, that modifications (or variations) *not* beneficial could not have been kept *uniform* by natural selection, even though injurious ones are eliminated by it. Hence his superadded theory of "Sexual Selection," which in its explication, occupies about two-thirds of this work. But it is a grave question how far this resort, instead of strengthening his original theory, may virtually prove an abandonment of it. Even in connection with these admissions, and before taking up the subject of sexual selection, he seems to have acquired sundry suspicions of certain *unknown* laws and agencies in organic being which neither theory can take into account.

> An unexplained residuum of change, perhaps a large one, must be left to the assumed action of those *unknown* agencies, which occasionally induce strongly marked and abrupt deviations of structure in our domestic productions. (Vol. I, p. 148.)

This very remarkable admission, which opens a wide door for parting company with Mr. Darwin's fascinating speculations, is reiterated still more strikingly and candidly in the conclusion of his work. Speaking of structures presented by man as well as other animals which have been of no service to them either in the past or the present, he says:

> Such structures can not be accounted for by *any* form of selection, or by the inherited effects of the use and disuse of parts. We know, however, that many strange and strongly marked peculiarities of structure occasionally appear in our domesticated productions: and if the unknown causes which produce them were to act more uniformly, they would probably become common to all the individuals of the species. We may hope hereafter to understand something about the *causes* of such occasional modifications especially through the study of monstrosities: hence the labors of experimentalists, such as those of M. Camille Dareste, are full of promise for the future. In the greater number of cases we can *only say* that the cause of each slight variation and of each monstrosity lies much *more in the nature or constitution of the organism*, than in the nature of the surrounding conditions: though new and changed conditions certainly play an important part in exciting organic changes of all kinds. (Vol. II, pp. 370–1.)

It seems obvious enough that such a recognition of some inherent, innate power or law in the *nature and constitution* of living organisms, is, if not a virtual retraction of the theory of natural selection, at least a confession that there are causes and agencies at work in the development of living beings, of which the Darwinian system can give no account. We have here admissions not only of plenty of abrupt *leaps* in nature, but also of various continuities of existence which are not only not expressed by, but which appear directly to *contradict* "the survival of the fittest." And these admissions come in even after the secondary hypothesis of "sexual selection" has been thoroughly utilized as far as the least plausible explanation of facts will admit.

Having thus pointed out the relations of this work, on the "Descent of Man," to its predecessor, on the "Origin of Species," and some of the apparent "changes of front" which it seems to exhibit in principle, we will now remark upon the various lines of argument by which Mr. Darwin seeks to establish the essential identity of man with the lower animal organisms, and the evolution of the present human being with all its faculties and qualities out of those lower forms. This inquiry of course takes us into the psychological and ethical, as well as the mere zoological question. Mr. Darwin of course would object to the use of the word *natures* in this connection, and have us treat of man as to his physical, intellectual and moral capacities or characteristics, holding that all three are essentially one in their origin and nature.

No matter if the Poet wrote:

> What a piece of work is man! How noble in reason! how infinite in faculty! in form and moving how express and admirable, in action how like an angel! in apprehension, how like a god! the beauty of the world! the paragon of animals!

All these noble faculties are nothing different *in kind*, but only in *degree*, from the developed instincts of ants and bees, or the ceaseless chatter and curiosity of the Simiadae. It is not necessary, in the interests of science, that Mr. Darwin should apologize for his views, when based on indisputable facts by legitimate induction, or ask us not to be ashamed of them. To as little purpose is it to assure us that they are not inconsistent with religion, so long as we are in the dark as to what his idea of religion is, further than a dim natural sentiment of reverence on the part of a lower animal toward one higher in the scale. The doctrine of metempsychosis is not inconsistent with some religions—say the Boodhist. But no one knows better than Mr.

Darwin, that his zealous labors against "the dogma of separate or special creations" really go to the question of *any creation at all:* and if his readers wish to escape the conclusion of the eternity of matter and the absence of creative Power in the universe, they will derive the slenderest possible aid, even from the presumptions and beliefs and suppositions which he so liberally bestows upon the successive steps of his blind unmoral agency of natural selection amid the million fold variations of organic being of which no other cause or solution is offered than *chance.*

To the believer in religion there is something almost sardonic in the argument that a belief in the immortality of the soul is no more affected by the proof of man's descent from an ascidian, than, as he intimates, it ought to be by the difficulty of telling at what precise moment "before or after birth, man becomes an immortal being." (Vol. II, p. 378.)

Even had he put in a special *protestando* against an atheistic Materialism, which we can hardly discover that he intends to do, that of itself would not affect the legitimate conclusions which Theists generally might draw from his positions, and the reasoning by which he supports them. We observe that much is said of the duty of theologians in these days to harmonize their religion with science: but we suppose, it would be deemed absurd to claim that speculations in science should pay much deference to religion. Of the first preachers of religion, however, the one who could speak "science" best, seemed too little concerned to reconcile his "strange doctrines" to the ears of Epicureans and Stoics, apparently thinking that if he could but have access to the heart of humanity at large, he might safely leave Epicureans and Stoics to settle their differences among themselves.

We approach the subject first on the side of zoological details, that on which the strongest points of Mr. Darwin's theory are found. That man is an animal can not be disputed: neither is it denied, that his bodily organization presents many "homologies" with that of other animals, as all other animals do with those of each other. The same chemical constituents enter into his body: "man is constructed on the same *general* type or model with other mammals:" his body is subject to similar laws of reproduction, growth, decay, and death: its muscles, nerves, blood-vessels and bones, are represented by more or less similar ones in the higher forms of inferior species, such as the anthropoid apes: he is liable to some of the same diseases, such as hydrophobia, &c.—a fact, which Mr. Darwin says, "proves the close similarity of their tissues and blood" better even than chemical analysis or the microscope could prove it. To all appearance too, *embryonic* development is almost identical, presenting characters so absolutely alike (to the naked eye) as to give no notice at first of the specific development which is to take place. Mr. Darwin finds resemblance also in certain rudimentary organs, such as the *os coccyx*, remnants of the *panniculus carnosus*, by which horses and cattle twitch their skin; the ability that some people have to move their ears: the straggling hairs upon the body, taken as the rudimentary recurrence of an ancestral hairy coat; the keen sense of smell, of little use, but inherited, &c.; the small *point* on the inner margin of the outer fold of the human ear, first observed by Mr. Woolner, the sculptor; muscular variations in the human frame apparently tending in the direction of the lower animals, taken as indications of *reversion*, &c. All this Mr. Darwin sums up by saying "It is in short, *scarcely possible to exaggerate* the close correspondence in general structure, in the

minute structure of the tissues, in chemical composition, and in constitution, between man and the higher animals, especially the anthromorphous apes."

Now, the question is, do these homologies *prove*, we will not say community of authorship, but community of *descent?* Mr. Darwin's argument is, these animals in certain respects, are *alike:* therefore they *must* have descended from one common form. Why *must* they? To take this for granted begs the whole question. The argument proves too much. Take the question of "chemical composition." Is the sameness of chemical constituents, identity of nature and properties? Any chemical tyro may answer that question. Laws of chemical combination are fixed, but even these combinations are not spontaneous, neither may we know the mysterious secret why the combinations of the elements are as they are, or why the charcoal or the graphite does not "develop" into the diamond. On the hypothesis of *creation*, which must stand till *proved* false, the *onus probandi* being with the evolutionists, ought not the community of *elements* in various organisms to have resulted in certain numerous resemblances, *quoad* their organization?

The fact that man has much in common with the animal, vegetable and mineral world of which he is made the master, only goes to confirm the received account of his origin, since it is the only conceivable way in which a rational soul could be put in relation with that world, to "replenish and subdue it," to handle and come in contact with it, and to fulfill the manifest teleological scheme written on the face of created things, (if it be not a "mere snare laid to entrap our judgment") by which he becomes the final cause of all terrene orders and developments, as a kind of microcosm in himself.

So, then, of this question of embryonic development.

The salient feature in Mr. Darwin's reasoning reminds us of a critical comparison of Bacon and Descartes, the two leading minds of their age, which we casually read some thirty years ago. The mind of Descartes, it was declared, was of that order which detects the minutest differences between things which are alike: while Bacon's mind was more busied in following up those occult resemblances which are to be found between things that on the surface are totally unlike, thus finding a basis for his "*Prima Philosophia.*" Well, Mr. Darwin loses no benefit of his *resemblances.* If, instead of selecting some particular period of development in his embryos for the sake of comparison, he had gone back to the very beginning to tell us of the embryo *matter*, he might have said, what is but the truth, that so far as *appearance* is concerned, not even the microscope would determine whether that matter would develop into a dog, bird, fish, or a human animal. *Is* it therefore the same and identical in all these cases? Yet there is the whole of Mr. Darwin's logic. *What* is it that develops this embryo into one or other of those living forms? Can it be any such thing of accident as Natural selection: or must we refer it to one of those "unknown agencies" which lie more in the *nature and constitution of the organism* itself than in the nature of the surrounding conditions, and to which he thus dimly refers in explanation of certain phenomena that refuse to come under his theory? In short, must we refer it to that principle so briefly expressed in a certain old fashioned account of the creation of all orders of organic beings,—"whose *seed* is in itself"?

A writer in a recent number of the *British Quarterly Review* brings forward some facts we do not recollect to have seen elsewhere in discussions of this question. He denies *in toto* that similarity of structure is *due* to

community of origin: and more than intimates that the evolutionists fight shy of the microscope and are very reticent on the subject of microscopic investigation. Those who have read the "Descent of Man" will judge whether this observation is well founded or not. We can not but agree with him when he says "It is certainly remarkable that a fact which Mr. Darwin evidently considers of vast importance (the close correspondence of human and animal tissues in their minute anatomy) and which is capable of being easily put to the test of observation, should be stated without the results of a single observation being recorded."

Before going into details, he uses the following language, in which one can not but recognize some tinge of severity:

If, however, the tissues, blood and secretions of man were like those of animals, that is, if they could not be distinguished from the latter in ultimate structure and chemical composition and properties, we should be quite ready to accept Mr. Darwin's conclusion; and not a few of Mr. Darwin's readers will imagine that such is really the case; for the language employed almost implies that a very exact likeness has been proved to exist. Mr. Darwin has, however, been careful so to express himself as to lead his readers to adopt the inference he desires, without laying himself open to the charge of undue persuasion, while professing only to be laying facts before their unbiased judgment. In truth, such enthusiasm has been stirred up in favor of Mr. Darwin's doctrine that the task of criticism has become unpleasant, and it requires some courage even to hint that after all they *may* not turn out to be true. And yet it is not possible for any one who has studied anatomical structure to assent to many of the statements in the very first chapter of Mr. Darwin's book. As regards bodily structure and chemical composition, and also minute structure of tissues, there are *points of difference* between man and animals more striking and remarkable than the points in which *resemblance* may be traced. So too, with reference to embryonic development, resemblance increases the further we go back, and much more may be proved than Mr. Darwin requires for the support of his hypothesis. An embryo man is not more like an embryo ape than either is like an

embryo fish. The mode of origin and the development of every tissue in nature are indeed alike in many particulars, but this fact, so far from being an argument in favor of the common parentage of any or all, seems to indicate that all are formed according to some general law, which nevertheless permits the most remarkable variations, not solely dependent upon either external conditions or internal powers.

Prof. Huxley says the explanation advanced by Mr. Darwin is the only one that has been given "of the marvelous fact that the embryos of a man, dog, seal, bat, reptile, &c., can not at first be distinguished from each other." But what explanation does he give of it? "Not only is man's brain developed like the dog's brain, but the *matter* in which every one of his organs originates is like that from which every other tissue in nature is evolved." But when those tissues have begun to be evolved, then "if we examine particular tissues by the aid of high microscopic powers, we shall discover points of difference as well as points in which they agree, and this at every stage of growth subsequent to the time when the tissues have acquired their special characters. * * * If we study carefully the minute structure of corresponding tissues, we shall find that in many instances we are confronted with the most striking and peculiar differences, which tend to establish the idea of individuality and distinctness of origin, rather than that of the community of origin of creatures closely allied in zoölogical characters."

He then takes several animals so closely allied as the newt, frog, toad and green tree-frog, and shows very marked and wide differences of tissues; individual differences and differences in the scale upon which they are formed; differences in the nerve-fibres, muscular fibres, kidneys, cuticle and pigment-cells of the skin, &c., &c. Mr. Darwin of course, would endeavor to turn these facts in favor of development by natural selection.

But if so, his argument from *identity* or *close correspondence* falls to the ground, seeing it does not exist. This writer says:

> On the other hand, actual investigation into the structure of certain corresponding tissues demonstrates remarkable individual peculiarities, and these seem to increase in number the more thoroughly and the more minutely the tissues are explored. What if, in the case of closely allied species, such structural differences be demonstrated in every part of the body? Will the fact be urged in support of a common parentage, or in favor of some different view? It may be fairly asked, if two closely allied forms have descended from a common progenitor not far removed from either, why should almost every tissue and organ in the body exhibit individual peculiarities, not one of which can be regarded as of advantage to the creature, or as contributing in any way to its survival?
> * * * * If close correspondence in minute structure is to be accepted as an argument in Mr. Darwin's favor, he will surely hardly venture to assert that *differences* in minute structure point to a similar conclusion, though both sets of facts might be ingeniously used in support of this eminently elastic hypothesis. If the supposed correspondence were established, the evolutionist would of course point to the fact in *proof* of a common parentage; but if, on the other hand, the supposed correspondence should be proved to be a fiction, he might retort triumphantly, "Only see in what infinitely *minute* structural particulars the law of *variation* by natural selection manifests its operation!" (*British Quarterly Review*, October, 1871.)

The same writer, who appears to be a good anatomist, which is precisely what is wanted in dealing with such a question, refers to Mr. Gulliver's investigations into the varying form and size of the red blood-corpuscles in different animals, which seem to bear no constant relation to the size of the animal or its position in the zoölogical scale. Mr. Darwin's argument seems to proceed on the supposition that the structural character of man and animals has been thoroughly investigated and is fully known, whereas "we know neither our own structure nor that of any plant or animal in the world." This

subject of minute anatomy is yet, so to speak, in its infancy, if we regard what yet remains to be ascertained. "Of what worth is an argument resting on the fact of hundreds of representative muscles, tendons, bones, and eminences on bones, in closely allied species, if the very muscles, tendons, and bones themselves exhibit minute and constant structural differences? And if besides these anatomical differences, we meet with differences as regards the rate of development—differences in the order of development of certain organs and tissues—differences in the structural changes going on after development is complete, what shall we infer?"

Mr. Darwin himself seems ready to abandon his "provisional hypothesis" of *pangenesis*, although he was at first disposed to incorporate it with his theory of Natural Selection. As to chemical composition, and the homologies depending upon this, it appears that the blood-discs even of animals belonging to the same class are very different, while the blood of one species will not nourish the tissues of another. "Not only does the blood of man differ from that of the lower animals, but the blood of every species of animal differs from that of every other species."

It would seem that the investigations of anatomy and physiology go much further to establish the doctrine of the *fixity* of species than that of evolution by Natural Selection.

It seems a waste of time to go over the speculations on the subject of *variation*. After all that is said of "protoplasm," "molecular" action, &c., that which underlies the phenomenon of *life* forever escapes the grasp of science. Vital phenomena can not be imitated in the laboratory. The changes of living matter belong to living matter only. And we can not but thank the writer already cited at some length, for the following remark:

Nothing surely can be more illogical or unscientific than to assert that actions about which we know nothing, are of the same kind or nature as actions which are understood, and can be brought about whenever we will. Yet physicists, chemists, and indeed most scientific men have fully committed themselves to the dogmatic creed that the phenomena of living matter are, like all the other phenomena of nature, due to antecedent physical change. There are no physical phenomena to which they can point, that in the remotest degree resemble the actions peculiar to living matter.

Everything goes to show that variability implies a fixed and constant *type*, whose variations are its own, and not involved with those of other species. "Transitional forms" are but monstrosities, outside the conditions of continued existence.

This whole subject of "homologies" is of little account, when we come to take cognizance of the *differentia*. Mr. Wallace has shown very strikingly what Natural Selection, even when aided by "Sexual Selection," could not have done for the development of man. On Mr. Darwin's hypothesis, neither of these agencies ought to produce organs which are of no advantage to their possessors, or organs which are much beyond the average required by the existing conditions in which an animal is placed. Mr. Wallace makes a convincing point of the size of the human brain, even in the lowest specimens of the race, with that of the highest specimens of the anthropomorphous apes. He says:

The collections of Dr. J. B. Davis and Dr. Morton give the following as the average internal capacity of the cranium in the chief races: the Teutonic family, 94 cubic inches; Esquimaux, 91; Negroes, 85; Australians, 82; Bushmen, 77. These last numbers, however, are deduced from comparatively few specimens, and may be below the average, just as a small number of Finns and Cossacks give 98 cubic inches, or considerably more than that of the German races.

It appears, too, that the few pre-historic remains of man show no average diminution in the size of brain.

It is of course too late to deny that size of brain is one, perhaps the most important measure of intellect; for whenever an adult man has less than 65 cubic inches of brain, he is invariably an *idiot.* Compare these figures now with those of the anthropoid apes:

The adult Orang-Outang is quite as bulky as a small-sized man, while the Gorilla is considerably above the average size of man, as estimated by bulk and weight; yet the former has a brain of only 28 cubic inches, the latter one of 30, or in the largest specimen yet known of 34½ cubic inches. We have seen that the average cranial capacity of the lowest savages is probably not less than *five-sixths* of that of the highest civilized races, while the brain of the anthropoid apes scarcely amounts to *one-third* that of man, in both cases taking the average; or the proportions may be clearly represented by the following figures—apes, 10; savages, 26; civilized man, 32.—*Essays by Alfred Russell Wallace: "Limits of Natural Selection as applied to Man."*

Now if one compares an English Premier with an Australian native that can hardly count his own fingers, from the point of view of *nature and natural selection,* what does the savage want with a brain equal in capacity to that of the European, and how came he by it? Here is a brain capable, under different circumstances, of performing work of an immensely different *kind* and *amount* from any that is now ever required of it?

Truly this Natural Selection must be something, or have something behind it, vastly "*wise* above what is written"! Such facts as these not only make conclusively against Natural Selection as the originator and developer of species, but as it seems to us, are hardly reconcilable with any theory of evolution at all. It is not to be forgotten that the *capacity* of all the culture of civilization exists in these lowest savages, even though in their present condition they may use hardly any higher faculties in procuring their subsistence than the animals around them. As the Bishop of Lichfield declar-

ed in a recent speech, entitled as he is to bear witness from thirty years' experience among the cannibals of New Zealand, no difference of race seems to present any barrier to the ready reception and easy understanding of Christianity wherever it is carried. The lowest savages give occasional manifestation of the latent capacities that belong equally to the human organism everywhere. As Mr. Wallace remarks, "some tribes, such as the Santals, are remarkable for as pure a love of truth as the most moral among civilized men. The Hindoo and the Polynesian have a high artistic feeling, the first traces of which are clearly visible in the rude drawings of the palæolithic men who were the contemporaries in France of the Reindeer and the Mammoth. Instances of unselfish love, and of deep religious feeling, sometimes occur among most savage races." Nothing could more clearly and convincingly establish the great gulf, *hiatus*, or "*saltus*" between man and the highest of the brute creation—a gulf that is not to be bridged over by a few indeterminate physical homologies. Though an evolutionist himself, Mr. Wallace concludes his observations on this branch of the subject by saying:

> The brain of pre-historic and of savage man seems to me to prove the existence of *some power*, *distinct* from that which has guided the development of the lower animals through their ever-varying forms of being.

Mr. Darwin does not call in his theory of Sexual Selection to meet these objections of Mr. Wallace as to comparative size of brain and mental development: he merely says that "man in the rudest state in which he now exists, is the most dominant animal that has ever appeared on the earth." But why the most dominant? It is for Mr. Darwin to prove that Natural Selection made him so. Instead of that he dismisses

the whole argument by merely saying "I can not therefore understand how it is that Mr. Wallace maintains that Natural Selection could only have endowed the savage with a brain a little superior to that of an ape." (*Vol. I, p.* 132.) Most certainly, because that was all that Natural Selection, *ex vi termini, could call for!* We hardly know an instance of more unsatisfactory dealing with a valid objection. Is not Mr. Darwin bound to explain on his principles why, as between the gorilla and the savage, mental activity in the latter has not grown *pari passu* with the size of the brain, and why the *gap* between the savage and the gorilla is *less* in mental activity but *greater* in size of brain than that between the savage and the civilized man? This is a *crux* to Mr. Darwin's whole system.

In regard to the physical resemblances in man to the higher apes, it would seem that M. Pruner Bey, in a paper for the Anthropological Society, which goes minutely into anatomical differences, points out, that independently of those differences in attitude, gestures, movements and aspect which so decisively class the ape among brutes, there are at least *three* characters common to all apes, that render them radically different from man. First is their hairy coat and the lack of that conformation of the hand and its tactile papillae which in man produces the geometric or *peripheric* sense: secondly, dentition, the ape having a canine tooth as a weapon of offence: thirdly, the direction of the axis of the body in its natural posture, horizontal in the ape, vertical in man, the arrangement of bones conforming to this direction in each case.

Marked points of difference also are observed in the muscular and circulatory systems, and the structure of the viscera, some apes being simply herbivorous. In the various apes the facial surface exceeds that of the

cranium, and the huge supraorbital crests contain nothing, but are a mere sign of bestiality. The eye is not placed below the brain, and its axis, instead of being horizontal is directed downwards and outwards, while the concave face and retreating chin produce a muzzle and tendency to prognathism. There are striking differences in the maxillary bones and teeth, and the internal mould of the cranium. He concludes that the ape differs anatomically from man not merely by degradation, but by *contrast* in every part; and that even from its first appearance in the Miocene age, judging from the mandible and the bones of the extremities, the ape has always presented the same characters as now.*

The next point noticed by Mr. Wallace as unexplainable on Mr. Darwin's theory, is the naked skin of man, in contrast to what obtains as a general law among the mammalia. Mr. Darwin thinks he has the inherited "rudiments" of this hairy coat: and speculates a little as to the possibility of his having *lost* it by exposure to heat, since elephants and rhinoceroses are hairless, while some extinct species that formerly lived in an arctic climate, had long wool: but how is it that the species of other mammals that have always lived in hot climates have long hair, and how should he know that the species that lived in arctic climates did not *acquire* their hair there, instead of *losing* it in hot climates? This is mere guess and presumption. But Mr. Darwin feels the force of the objection. He sees clearly enough that the principle of Natural Selection which is supposed to work always for the *good* of the creature, could never have eliminated this hairy coat in man (considered only as an *animal*) and above all, caused it to disappear more completely from the *back* (where he most needed it) than from any other part of the body, compelling the savages

* Cited in *Living Age*, No. 1363.

to resort to all sorts of ludicrous *un*dress, not from modesty, so much as to keep their backs and shoulders dry and warm. Mr. Darwin seems to be here in a position not unlike that of the great Philosopher when Diogenes threw in at his door a practical illustration of his scientific definition of Man as "a two-legged animal without feathers"! A new adjustment must be made—a new buttress put up where the building seems most likely to tumble down. To meet this and some other difficulties, therefore, Mr. Darwin has devised the theory of "*Sexual* Selection" which, as we have said, takes up the far larger portion of his last work.

Under this head Mr. Darwin includes the struggle between several males for the possession of a female, and the preference which may be exercised by the female for one male over another. The former case seems to imply about the same thing as Natural Selection, since the same advantages that would give an animal superiority in the "struggle for existence" would operate in his favor in the contest for a mate and the continuance of his species. In this case, at least, the choice of the female would have to correspond with the "choice of battle," and she would be essentially *passive* in the matter, submitting to superior strength herself. It seems to us in the highest degree absurd even on Mr. Darwin's principles of development, to attribute the acquisition of those organs or modifications in the male which give him greater swiftness to find and overtake the female, or greater facilities for "holding her securely" to any such cause as Sexual *Selection*. Mr. Darwin does not pretend that *primary* sexual characters can be derived from Sexual Selection, and he admits the difficulty of drawing the line between primary and secondary sexual characters. All that even his theory would bear, as it seems to us, is that *secondary* sexual

characters, such as mane, horns, wattles, &c., might be modified, but not originated by Sexual Selection. Besides it is difficult for us to see how weapons of offence or defence for "driving away their rivals" could have been developed by Sexual Selection, when the same weapons would be needed in the pursuit of prey or the struggle for subsistence. These sexual modifications, too, are so numerous and varied, the same taking place sometimes in one sex and sometimes in the other, that the subject appears rather confused, and hardly to admit of laying down such a definite law. There seems to be a law that the male should be the seeker, and more "eager," but this is not universal. Monogamy is the rule but polygamy is frequent. There is nothing in the theory to explain the exceptions and apparent contradictions. And then it appears too that Sexual Selection actually works *against* Natural Selection; for, it seems, we have the "development of certain structures, such as the horns in certain stags, carried to an *extreme* which as far as the general conditions of life are concerned must be strictly *injurious* to the male." Upon this we have the following incredible comment:

> From this fact we learn that the advantages which favored males have derived from conquering other males in battle or courtship, and thus leaving a numerous progeny, have been in the long run greater than those derived from rather more perfect adaptation to the external conditions of life. We shall further see, and this could never have been anticipated, that the power to charm the female has been in some few instances more important than the power to conquer the other males in battle. (Vol. I, p. 270.)

Here then we have Sexual Selection not merely supplementary to, but superseding Natural Selection.

Now surely the cause is unknown that determines the primary sexual characters of an animal: and some secondary characters are always developed where no Sexual Selection could have operated. It is easier to

suppose that *all* sexual characters are due to the same cause, than to refer some few particular instances to selection while leaving the greater number unexplained.

But the *modus operandi* of Sexual Selection, upon which Mr. Darwin principally relies, is that according to which the female exercises a preference in the selection of the male, the latter transmitting to his progeny of *his own sex* those qualities of plumage, colors, song, &c., which gave him the advantage in female appreciation. This, of course, is a *gradual* process like that of natural selection. His chief examples are from the class of birds; and to females of this class he really attributes a perception and sense of the beautiful—an æsthetic taste and nicety hardly developed in the most cultivated of what we have been accustomed to call *rational* and moral beings.

It is, of course, hard to prove a negative: all we can say is, that the affirmative is very far from being demonstrated. There is such an air of *uncertainty* about all Mr. Darwin's discursive speculations on this subject, that one feels he could cite facts out of such a vast field, if he chose, to prove almost any theory whatever, if he would only let the exceptions go without explanation. There are plenty of exceptions and apparent contradictions in this case, as we may gather from his own pages.

The variations in breeds of fowl are often spontaneous and sudden, and appear in either sex indiscriminately: and what is the reason, consistent with Sexual Selection, that some variations are "sexually limited" and others not? He can not conjecture why the tortoise-shell color in cats is developed in females alone, while pigeons, alike in a state of nature, under artificial breeding acquire sexual characters "even in opposition to the will of the breeder," which is evidence enough of some law of *spontaneous* development, *other* than that of Sexual

Selection. If the glow-worm has a light to attract her mate, so have luminous larvæ where there is no sexual action: and if stridulating noises in some male insects is proof of Sexual Selection, how is it when both sexes stridulate, as he states is the case with certain Neuroptera and many Coleoptera. In the case of butterflies, though he draws on them largely for proofs, he yet finds many instances where beauty seems of no account in pairing, and Dr. Wallace, with his experience in breeding silk moths, found no indications of choice or preference in the females. And yet these moths are beautifully colored. The numerous instances of combat among the males of species, from insects and fishes up to the higher orders, make directly against the operation of Sexual Selection. And notwithstanding these combats, it appears that the males of some species, as in the salmon, have become *smaller* and weaker than the females, which is only "surprising" to Mr. Darwin. So likewise in the case of horses, sometimes the caprice is on one side and sometimes on the other. In some monkeys the female excels in *colors*, while in other sexual characters the usual rule prevails. In such cases, Mr. Darwin supposes selection is reversed, which is a purely arbitrary shifting of ground. In all the illustrations cited, there seems only a kind of caprice or fancy, utterly uncertain and changeable, in each individual. How can such caprice result during long periods in the *constant* colors and other sexual characters sometimes of one sex, and sometimes of the other?"*

The feature of colors is conspicuously illustrated in the class of birds, which give Mr. Darwin his principal arguments. And here we find the same "law of battle" which certainly limits female "selection," if there

* See many instances cited in London *Quarterly Review*, July, 1871.

be any; and birds that fight have their varieties of *color* as well as others. In some cases, too, it is the female that courts, where the male sexual characters are as distinct as in other cases.

Mr. Darwin seems purposely to apply to the caprices and actions of birds a good deal of *moral* language, as if to assimilate them to human conduct; but he can give no more evidence that birds act in their courtship from human motives than that a bee builds its cells from a conscious knowledge of geometry as a science. Amidst all the wealth of facts of Natural history which he displays, there are many cases of *back handed* argument and inference, which make against his hypothesis rather than for it. Thus, among other facts to prove that birds *choose* plumage and colors, he gives the following:

> Sir R. Heron during many years kept an account of the habits of the pea-fowl, which he kept in large numbers. He states that the hens have frequently great preference for a particular peacock. They were all so fond of an old pied cock that one year when he was confined though still in view, they were constantly assembled close to the trellice-walls of his prison and would not suffer a japanned peacock to touch them. On his being let out in the autumn, the oldest of the hens instantly courted him, and was successful in her courtship. The next year he was shut up in a stable, and then the hens all courted his rival. This rival was a japanned or black winged peacock which to our eyes is a more beautiful bird than the common kind. (Vol. II, p. 115.)

Now this would not only throw the power of "Selection" over on the male side, but it would show that if there be an "æsthetic taste" in peahens, it is very different from ours. There was preference, no doubt, but was it due to either plumage or color?

As to the *displays* made by some birds, such as peacocks, pheasants, &c., the facts indicate that these displays are often made when no females are present, and

therefore can not have exclusive reference to exciting the sexual instinct. The great number of facts and illustrations which Mr. Darwin adduces, instead of establishing his special hypothesis, appear to us conclusively to point to something deeper and more potent than either Natural or Sexual Selection—to some as yet unknown law "in the nature and constitution of the organisms" which determines sexual characters, and their transmission, some to one sex and others to the other. Mr. Darwin himself must admit that *some* sexual characters are not due to Sexual selection: how can he prove that *any* are, till we know what produces the former? Among so many modifications and varieties of phenomena, it is difficult to limit the category of true causes. Mr. Darwin thinks the brilliant plumage, ornamentation, and song power of birds are due to the taste and preference of the female, operating in "Sexual Selection." What if we say, the strongest and most vigorous will surely obtain the females, and that their superiority in plumage and song is due to their greater vitality?

But brilliancy of color and ornamentation are found in abundance where there is no female taste or caprice to be pleased. There are organisms enough distinguished for these qualities, where Sexual Selection could not have operated: such as caterpillars and other insects, whose infinitely varied ornamentation Mr. Wallace refers to some "unknown cause quite independent of Sexual Selection." A writer in the *Edinburgh* also gives a striking illustration of beauty, independent of Sexual Selection.

The gorgeous tints of a sea-anemone or of a coral, or the lustrous sheen on the hairs of a sea-slug or on the interior of an ear-shell, are as beautiful as the stripes of a tiger or the splendor of a bird of paradise. None could maintain for a moment that there is

the slightest difference between them as works of art. In some cases the design of coloring is the same in the higher and lower classes of the animal kingdom. In the cone-shell, for instance, the contrast between the black stripes and reddish background of the tiger's skin is exactly followed, and among the endless varieties of the cowry, some are ornamented with the same colors as some of the antelopes. It is only reasonable to account for this identity on the hypothesis that like results have been produced by similar causes, and that whatever may be the explanation of the colors of one class of organisms, ought also to explain the presence of similar colors in the other class. (*Ed. Rev.*, *July*, 1871.)

But Mr. Darwin is disposed to deny this, for what imaginable reason we do not see, and to attribute the colors of the lower orders of beings to *chemical* constitution, as in the case of forest leaves! This is too much like playing fast and loose with the facts of nature, or arranging them to accommodate a theory. We should be more inclined to say that colors in the lower orders, where there is no possibility of Sexual Selection, is proof that in the higher orders color and ornamentation are not due to *that* cause.

Moreover, if beauty were due to æsthetic preference, in a long course of Sexual Selection, it ought to be most conspicuous in those orders which have reached the highest physical and mental development, which is by no means the case. The microscope reveals forms and colors of beauty such as the keenest perceptions of human art could never have devised: and it is simply absurd to say that there is any mental power in the creatures themselves to appreciate their own wonderful structure and beauty. It is pure legend and mythology over again. Mr. Darwin limits beauty in the organic world to the mere purpose of reproduction: but this touches the merest fragment of Nature, which shows beauty in every detail of her operations, for what purpose, is not reached or even suspected by Mr. Darwin's theories.

If Sexual Selection thus fails to reconcile the phenomena of the lower orders, how is it to be accepted as explaining the development of man's peculiar bodily qualities, or the differences of races? If man was once quadrumanous, how did he acquire the habit of walking erect, and how did he acquire his present foot? Not by Sexual Selection, conceivably. And Mr. Wallace has shown, in the paper quoted before, that both the hands and feet of man could hardly by possibility have been developed from a quadrumanous ancestor, either by Natural or Sexual Selection. To what useful purpose was either the hairy coat or the prehensile power of the foot, and the opposable thumb taken away? Next to the human intellect it is the human hand that has made civilization possible: and all its marvelous powers are latent in the hand of the lowest savage that knows nothing of the requirements of civilization. So too with the human larynx and voice. All its powers are there, used or unused; and it is neither Natural nor Sexual Selection that reveals those powers under the culture of civilization. The organs of man, instead of being developed out of accidental variations according to the actual needs of his condition, bear all the indications of an *anticipation* of his future wants, and of having been prepared for a civilized condition, if not in *order* to make his civilization possible: but this is directly *against* Natural or Sexual Selection. And if the nakedness of man were due to Natural or Sexual Selection either, it should show something like gradation in animals next lower in the scale; whereas it is well known that there is no gradation in respect of hairyness at all, as the higher apes are much more hairy than some of the lowest monkeys.

In regard to the different races of men, Mr. Darwin's theory is by no means necessary to prove the unity of

mankind as a species. That is settled by physiological facts, as well as psychological. The differences of race are not enough to be tortured into an argument for, much less scientific demonstration of, alien species. One test, that of mutual fertility, which no two different species have yet shown to be deceptive, is fully met by all the different races of mankind.

Mr. Darwin, however, attributes differences of color, &c., to the mere *taste* of men and women in choosing their partners; for this is what Sexual Selection amounts to. Doubtless external change of conditions acts in the long run upon the human frame: and climatic conditions must go far to explain differences of race, independently of Sexual Selection, which may have been only one among many influences. If it were shown to be the *chief* influence, that would not help the hypothesis that man is descended from a lower order of the animal kingdom.

A writer in the *Edinburgh** calls attention to the experiments of Sir Everard Home, which show that "although a black skin absorbs more heat than a light colored skin, it also yields it up with much greater freedom and without blistering." This inclines him to attribute the color of Negroid races to the heat of the torrid zone. He thinks too, that such a variation might have appeared *suddenly*, instances of the kind being well known; in which case, however, they could not have been due to Natural Selection.

We now pass on to the psychological question, or the phenomena of the human mind. Professor Tyndal says, "It is a long way from the iguanodon and his contemporaries to the President and members of the British Association";† but Mr. Darwin believes that he has

*July, 1871. † Address before Sect A. of British Assoc.

traveled the whole of it. It may seem like presumption to attempt to approach the problem of consciousness from the side of mere natural history—the non-physical from the side of the physical, as if there were no barrier between them, or rather as if the distinction between them did not exist: but Mr. Darwin undauntedly attacks the question, in a manner that puts Philosophy under obligations to him for the conspicuousness of his failure. It is true that the "Physical" and the "Metaphysical" must always more or less interpenetrate each other's domains, as they always have done, since body and mind are in *some* way linked to each other: but though Materialists like Cabanis long ago thought to proclaim as their *Eureka* that "the brain secretes thought, as the liver secretes bile," yet philosophy has ever shown, what is gracefully acknowledged and eloquently set forth by Prof. Tyndal in the Address already quoted:

I hardly imagine that any profound scientific thinker, who has reflected upon the subject, exists, who would not admit the extreme probability of the hypothesis that for every fact of consciousness, whether in the domain of sense, of thought or of emotion, a certain definite *molecular condition* is set up in the brain; that this relation of physics to consciousness is invariable, so that, given the state of the brain, corresponding thought or feeling might be inferred. But how inferred? It is at bottom not a case of logical inference at all, but of empirical association. You may reply that many of the inferences of science are of this character: the inference, for example, that an electric current of a given direction will deflect a magnetic needle in a definite way; but the cases differ in this, that the passage from the current to the needle, if not demonstrable, is thinkable, and that we entertain no doubt as to the final mechanical solution of the problem; but the passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought and a definite molecular action in the brain occur simultaneously, we do not possess the intellectual organ, nor apparently any rudiment of the organ which would enable us to pass by a process of reasoning from the

one phenomenon to the other. They appear together, but we do not know why. Were our minds and senses so expanded, strengthened and illuminated as to make us to see and feel the very molecules of the brain: were we capable of following all their motions, all their groupings, all their electric discharges, if such there be, and were we intimately acquainted with the corresponding states of thought and feeling, *we should be as far as ever* from the solution of the problem. "How are these physical processes connected with the facts of consciousness?" The chasm between the two classes of phenomena would still remain intellectually impassable. * * * I do not think the Materialist is entitled to say that his molecular groupings and his molecular motions explain everything. In reality they *explain nothing.* The utmost he can affirm is the association of two classes of phenomena of whose *real bond of union* he is in absolute ignorance. The problem of the connection of body and soul is as insoluble in its modern form as it was in the prescientific (?) ages. Phosphorus is known to enter into the composition of the human brain, and a courageous writer has exclaimed, in his trenchant German, "*Ohne Phosphor Kein Gedanke.*" That may or may not be the case; but even if we knew it to be the case, the knowledge would not lighten our darkness. On both sides of the zone here assigned to the materialist he is equally helpless.*

We know not what Prof. Tyndal's metaphysics may be, or whether he is not intentionally using the language of Positivism; but we cite this passage, as the testimony of an eminent physicist himself, that even supposing science had arrived at an understanding of all the physical phenomena associated with mental action, the chasm between them is still impassable; and therefore man's higher nature is not yet bound to be regarded as either essentially one with, or as a dependant result of his physical organism. The real difficulty between the natural scientist and the metaphysician is, that the former has no concern with or conception of *Will*, while the latter is not satisfied with those mere formulas of sequence called "*Laws*," but looks beyond into the question of *cause*, and *being*.

* Reprinted in "*Living Age*," November 21, 1868.

If man were placed, as a spiritual and immortal being, in the midst of, and *en rapport* with, an organic material creation, it would not appear but that he must, *ex necessitate rei*, partake more or less of its physical characteristics, while having that in him which could not be common to the rest. But Mr. Darwin boldly sets out in his second chapter that "there is no fundamental difference between man and the higher mammals in their mental faculties." This not only ignores the whole difference between higher and lower faculties of the human mind, but is a defiance of all the established elementary principles of philosophy, by which sensation is distinguished from perception, instinct from self-consciousness, and understanding from the reason. It is the same substantially as saying that if beavers and bees build, it is because they have knowledge of the principles of geometry and architecture, and could construct other fabrics if they chose. And yet Mr. Darwin admits that man has to *learn* his simplest operations "by practice;" while the beaver or bee or bird can build the first time as well as ever. Now it is utterly impossible for us to understand how Mr. Darwin reconciles this simple fact with his assumption that the difference in mental faculties between man and brute is only in *degree* and not in *kind*. We look in vain for the explanation. He says:

> The greater number of the more complex instincts appear to have been gained through the natural selection of variations of simpler instinctive actions. Such variations appear to arise from the same unknown causes acting on the cerebral organization, which induce slight variations or individual differences in other parts of the body: and these variations, owing to our ignorance, are often said to arise spontaneously. We can, I think, come to no other conclusion with respect to the origin of the more complex instincts when we reflect on the marvelous instincts of *sterile worker-ants and bees*, which leave no offspring to inherit the effects of experience and of modified habits.— *Vol.* 1, *p.* 37.

Here we have the unknown causes of variability resorted to again, which is a sheer confession that the subject is inscrutable: even as the explanation offered is unintelligible. To argue from mental actions to those of the brutes, is a temptation to import into the latter the self-consciousness of the former—to put upon them the *interpretation* of our own self-consciousness—to fall completely into the snare of that anthropomorphism against which these writers warn us.

If the higher mammals do not differ from us "fundamentally" in mental faculties, who can conceive that there should *now be any* higher mammals coeval with man? Why, then, should the cattle of to-day be no better—no higher advanced than the "slow-rolling-footed kine" of Homer, or the sacred bulls of the Egyptians? It is the duty of Philosophy to guard its own realm against this barbarous invasion of Materialism under the guise of physical science. We can do no more than demand and scrutinize the physical evidence for a theory that pretends to base itself on physical facts. We have no fear that the great and irrefragable difference between the REASON of man and the lower faculties of the *Understanding*, which has been recognized in all the high forms of human thought, from Plato down to Coleridge and Kant and Hamilton, is to be eliminated by a revolution that precipitates all philosophy into the "sty of Epicurus." Aristotle, as much as any inclined to look at the question from the physical side, finds a break in the "organic chain" at the reason of man, and though the lower animals have memory, and acquire empirical experience, they have no faculty of universal conceptions, such as *law*, out of which springs science itself, and therefore all arts among men. He expressly says, without any bias of "theology," "*It only remains for us to conclude that the intui-*

tive power in man has come upon him from without and is something only divine; for the physical force of the body has nothing in common with the force of spirit."—Generation of Animals, II. III. 10.

In his Metaphysics too, he profoundly suggests that while some faculties may be attained by exercise, there are others, such as *reason*, which we have *by nature:* and that, [so far from this having been *developed* by the struggle for existence or Natural Selection] the *reason* of man has been *retarded* in most nations by the claims of our lower nature, and animal necessities. How much more truly this observation of the great thinker of antiquity corresponds with the testimony of consciousness, experience and common sense! Reason is not the *effect*, but the *cause* of human civilization: man's development is not from a lower *nature*, but the evolution of that which he already had *in* his nature, which is latent, even where there is no *exercise* of it to be transmitted by heredity. As Mr. Darwin remarks in one of his earlier pages: "The Fuegians rank amongst the lowest barbarians: but I was continually struck with surprise how closely the three natives on board H. M. S. Beagle, who had lived some years in England and could talk a little English, *resembled* us in disposition, and in most of our mental qualities." Vol. I, pp. 33–4.

This similarity, or identity, he elsewhere remarks upon as observable between American aborigines, and Negroes, and Europeans, which "differ as much from each other in mind as any three races that can be named."

The writer in the *Edinburgh* already cited, makes a very clear elementary statement which shows the confusion in Mr. Darwin's assumption, that because things have certain characters in common, there can be no *fundamental* difference. He shows, what might be suppos-

ed to be obvious enough, that sensation is not thought, but only supplies the objects of thought. The lower faculties or characters that we have in common with brutes are what are called the *Presentative* or Instinctive faculties. First is the reflex action of the nervous system, giving rise to involuntary actions without the intervention of either sensation or thought. Second, is Sensation. Third, is sensible Perception—observation of sensible objects. Fourth, is Association of sensible perceptions, giving rise to ideas. These are all *indeliberate* operations implying no *reflective* or representative faculty. Now what distinguishes the mind of man is the possession of two other and further faculties: Self-consciousness and Reason, by which sensible perceptions are reflected on, recognized as our own, and we ourselves recognized as ourselves: and by which, reflecting upon our perceptions, we think *what* they are and *why* they are. Now the *instinctive* faculties, according to this classification, are as perfect in the lower orders of animals as in the higher; nay, in what Mr. Darwin would recognize as *reason*, even insects, such as worker ants and bees (that leave no offspring too) are *superior* to most of the higher mammals. And if these instinctive faculties are all that are possessed by the brute creation, then we should not expect to find among them the gift of *speech*, the power of *concerted action*, or the capacity of being *educated*, in the civilized sense of that word: to say nothing of the faculty of reflection or self-consciousness, and perception of the difference of truth and falsehood, right and wrong. Well, do we find these things there? Mr. Darwin gives innumerable *anecdotes*. But everywhere he goes on the supposition that *sensation* is the whole source of knowledge and ideas—that there is no higher mental power: no such thing as intuition, as different from sense-percep-

tion. Hence he recognizes no difference in *kind* between the highest mental faculties of man and the instinctive faculties of brutes.

The writer before alluded to unanswerably remarks, that "two faculties are distinct, not in *degree* but in *kind*, if we may possess the one in perfection without that fact implying that we possess the other also. Still more will this be the case if the two faculties tend to increase in an inverse ratio. Yet this is the distinction between the *instinctive* and the *intellectual* parts of man's nature." (*Ed. Rev., July*, 1871.)

Now unless Mr. Darwin can show that all the facts of his anecdotes could not be accounted for by the instinctive faculties of sensible perception and association, without calling in Self-consciousness and Reason, his whole argument falls to the ground. It is utterly impossible to conceive how our higher intellectual powers of ratiocination, abstraction, self-consciousness, and metaphysical insight could have developed out of the exercise of those mere instinctive faculties of brutes which pertain simply to animal wants.

As to the gift of language, Mr. Darwin thinks it a development from the irrational cries by which brutes, as well as man, express their bodily sensations of pain or pleasure. The gap can not thus be bridged over. The real question is constantly avoided. In his first volume one would suppose that he attributed language to man's higher intellect: in the second volume, in the "General Summary," he attributes "the large size of the brain in man to the early use of language." That man's intellect can use animal sounds or cries and put meaning to them which he can *describe* in other language, is far enough from the notion that language itself is derived from modification of those animal sounds. Max Muller accounts for variations of dialect

and forms of speech by a sort of "Natural Selection," but the origin of language itself he would not regard as nearly reached by any such theory. Mr. Darwin says it is not *incredible* that some unusually wise ape-like animal should have *thought* of imitating the growl of a beast of prey, so as to inform his fellow monkeys: but some birds articulate certain sounds: is there any approximation in that to the use of words as expressing ideas in the mind, and the choice of words according to those ideas? The mere association of sense-perceptions does not begin to supply that power of abstraction which moulds and advances language, and thus makes language an effect of intellect instead of a cause of it. What is called this "*bow-wow*" theory of language runs on too low a plane to touch, much less to explain, the philosophical relations between human speech and human thought.

And as to the instances of concerted action among animals, by which of course is not meant mere gregariousness or association of kind, but mutual understanding and alliance, Mr. Darwin will have to convince us of the historical reality of Æsop's fables, or adduce something literally like them, before he can get beyond the mere phenomenon of associated sensible impressions which belong to instinctive faculties alone. His "unusually wise, ape-like animal," however, seems, as a matter of fact, never to have been realized. He declares, moreover, that "the fact of the higher apes not using their vocal organs for speech no doubt depends on their intelligence not having been sufficiently advanced," and he adds that their case is paralleled by many birds which have organs fitted for singing, but never sing. What then has become of that *development* by Natural Selection of those mental feelings and faculties in the lower animals which Mr. Darwin regards as a sufficient

explanation of the origin of intelligence? If they have all the necessary rudiments of our own intelligence, it is hardly satisfactory to be told that their development has stopped for lack of intelligence.

In summing up this subject of mental homologies, it is worthy of remark that the cultivation of the mental faculties, the lower class of which, those that pertain to mere sense-perception or the understanding, we have in common with the brutes, is that which writers of this scientific school seem to regard as the chief purpose and meaning of *education*, as they use the word. *Knowledge*, especially of the facts of nature, is their panacea for the evils and discomforts of the world, while, in fact, by itself considered, it may be justly regarded as putting man on that same line of mere animal development as the *rest* of the brute creation. There is doubtless such a thing as so training men, as if man were nothing but an animal, and thus making the Darwinian theory a practical fact. But none the less is it true, that man has that in him which is capable of higher and better things, if he will but see and recognize the teachings of his moral and spiritual nature.

No wonder, then, that Mr. Darwin regards this, the ethical side of humanity, as the last and most difficult fact to be reduced into harmony with his materialistic theory. Conscience or the moral sense, the ideal of right and wrong, the notion of responsibility, the sense of duty, the belief in the supernatural,—these are things hard to be developed out of the mere physical progress from the mollusc to the mammal.

The sense or belief of the supernatural, Mr. Darwin attributes to "the faculties of the imagination, wonder and curiosity, together with some power of reasoning" craving to understand what is passing around us, and "vaguely speculating on our own existence." Here he

brings in those faculties of reflection and self-consciousness for which the mere instinctive faculties common to us with brutes were utterly inadequate to account. This gap he ignores: and goes on to compare our feeling of religious devotion, to the state of mind in a dog that shows "a deep love for his master, associated with deep submission, some fear and perhaps other feelings:" and to the feelings of "a monkey returning to a beloved keeper."

It is hard to keep patience with this sort of argument. Does Mr. Darwin intend here to reason from dog to man or from man to dog? In either case it is an arbitrary resemblance *projected* from his own mind. Is there a *belief in the supernatural* in both cases? He speaks of the "high mental faculties which first *led man to believe* in unseen spiritual agencies, then in fetichism, polytheism and ultimately in monotheism" as also leading him while the *reasoning* powers were poorly developed, into "the terrible superstition of sacrificing human beings to a blood-loving god: of ordeal by poison, or fire," &c. Now what has become here of evolution by a beneficent Natural Selection which accumulates only advantageous variations? Mr. Darwin compares this sort of thing to the "occasional *mistakes* of instinct in the lower animals!" and speaks of the infinite debt of gratitude we owe to the improvement of our reason, to science, &c., that is, we suppose, to the inflexible chain of our evolution!

We shall not pursue the bearing of this most extraordinary view on the question of any Theism at all.

As to the origin of our ideas of right and wrong, Mr. Darwin finds the theory of Utilitarianism most convenient for his purpose. His explanation is, in brief, that they are the accumulations by natural selection of man's experience of what is *useful* or what is injurious

in all actions. With Herbert Spencer, Stuart Mill, and Sir John Lubbock, he may admit that the notion of *right* has become at last detached or dissociated from a conscious experience of the useful, but such he maintains is its *origin*. Mr. Mivart has so thoroughly exposed the fallacy of all this reasoning, in his IXth chapter, that his readers can not but join heartily in his remark, that "Hasty and incomplete observations and inductions are prejudicial enough to physical science, but when their effect is to degrade untruthfully our common humanity, there is an additional motive to regret them." Mr. Darwin finds among some savages an "abhorrence" of incest, and argues that it arose from experience of its evil effects, which experience produced a sense of its pernicious nature which has been *inherited*. But so far from showing that offspring can inherit what their parents never had, he does not even account for those "spontaneous variations" by which it often happens that descendants lose what their parents did have. Besides, can he show the least trace of such an idea among brutes —say even the highest of his higher apes? The ideas of right and utility are so far from being identical, that in the experience of mankind they have often proved most *antagonistic* to each other. Mr. Darwin himself, in one of his books of Travels, refers to a custom of the Fuegians to kill and eat their old women—a highly *useful* act in their view, as both increasing their scanty supply of food, and diminishing the number of mouths for its consumption. Such would be the morality and benevolence developed by a purely material, unmoral natural selection.

It is certainly a striking admission of the absoluteness of innate moral intuitions that Mr. Mivart points out in one of these writers of the utilitarian school—Mr. J. Stuart Mill, in his remarks on Sir William Hamilton's

Philosophy. Mr. Mill says: "I will call no being *good*, who is not *what I mean* when I apply that epithet to my fellow-creatures; and if *such* a being can sentence me to hell for not so calling him, to hell I will go." This is diametrically opposed to the utilitarian theory, and asserts the absolute character of our moral intuitions. It is clearly shown, too, that such a maxim as "*Fiat justitia ruat coelum*," could never have been compatible with, much less evolved out of, a utilitarian source. The elementary distinction also between acts *materially* moral and *formally* moral, is one that utterly annihilates the figment of an origin in utility. The actions of animals that *simulate* morality, are merely the *association* of sense perceptions of pleasure and pain with certain acts, and belong to our lower nature. There is nothing *moral* in the mere expectation of reward or the fear of punishment as associated with certain external acts. We feel that the *moral* quality attaches only to *conscious choice*, and can exist only in a being that is a free agent. These two correlative ideas, *spontaneity* and *responsibility*, can not be accounted for on any system of mere materialism. They utterly refuse to attach to any mere natural process, governed by physical laws. And yet even Mr. Mill bears vehement witness to an absolute ideal of right and wrong and the absolute independence of the human will,—even as against omnipotence itself. He more than realizes the old Promethean invincibility—

> "Nor stony tower, nor walls of beaten brass
> Can be retentive to the strength of spirit."

Both men and brutes then can perform acts that are *materially* moral, as in the care of offspring, "retrieving," &c.; but they do not approximate the *formal* morality, without conscious volition and choice. As

Mr. Wallace remarks, the utilitarian hypothesis could never account for that peculiar *sanctity* which even savages attach to what is absolutely *right* as contrasted with the feeling which is connected with what is only *useful.* The utilitarian theory is simply the Atheistic substitute for the Moral rule of Theism. Mr. Lecky, who has with great ingenuity followed up the subject of Morals from the side, so to speak, of its Natural History, as Mr. Darwin has the question of the origin of man, finds ample reason to combat vigorously the utilitarian views of Bentham, Mill and Herbert Spencer. In his able and interesting work on this subject, he describes the intuitive theory of morals as confirming these two propositions: 1st., that our will is not governed by the law of pleasure or pain merely, but also by the law of duty, which we feel to be distinct from the former and to carry with it the sense of *obligation;* 2d., that the basis of our conception of duty is an *intuitive perception* that among the various feelings, tendencies and impulses that constitute our emotional being there are some that are essentially good and ought to be encouraged, and some which are essentially bad, and ought to be repressed. This is regarded as simply a "psychological fact." And as to the utilitarian theory directly, he says:

When moralists assert that what we call virtue derives its reputation solely from its utility, and that the interest of the agent is the one motive to practice it, our first question is naturally how far this theory agrees with the feelings and with the language of mankind. But if tested by this criterion there never was a doctrine more emphatically condemned than utilitarianism. In all its stages and in all its assertions it is in direct opposition to common language and to common sentiments. In all nations and in all ages the ideas of interest and utility on the one hand, and virtue on the other, have been regarded by the multitude as perfectly distinct, and all languages recognize the distinction. The terms honor, jus-

tice, rectitude or virtue, and their equivalents in every language, present to the mind ideas essentially and broadly differing from the terms prudence, sagacity and interest. The two lines of conduct may coincide, but they are never confused, and we have not the slightest difficulty in imagining them antagonistic. When we say a man is governed by a high sense of honor, or by strong moral feeling, we do not mean that he is prudently pursuing either his own interests or the interests of society. The universal sentiment of mankind represents self-sacrifice as an essential element of a meritorious act: and means by self-sacrifice the deliberate adoption of the least pleasurable course without the prospect of any pleasure in return. A selfish act may be innocent, but can not be virtuous, and to ascribe all good deeds to selfish motives, is not the distortion but the negation of virtue. (*Hist. of European Morals*, Vol. I.)

Mr. Wallace's argument on this point is one that never has been, and can not be answered. He takes an example from the intuitive sense that all men have of the moral difference between truth and falsehood.

The utilitarian sanction for truthfulness is by no means very powerful or universal. Few laws enforce it. No very severe reprobation follows untruthfulness. In all ages and countries, falsehood has been thought allowable in love, and laudable in war: while at the present day it is held to be venial by the majority of mankind in trade, commerce and speculation. A certain amount of untruthfulness is a necessary part of politeness in the East and West alike, while even severe moralists have held a lie justifiable to elude an enemy or to prevent a crime. Such being the difficulties with which this virtue has had to struggle, with so many exceptions to its practice, with so many instances in which it brought ruin or death to its too ardent devotee, how can we believe that considerations of utility could ever invest it with the mysterious sanctity of the highest virtue—could ever induce men to value it for its own sake, and practice it regardless of consequences? (*Limits of Natural Selection, &c.*)

Conscience, Mr. Darwin reduces to a conflict between social and personal instincts, the former, as concerned with the general good in the long run, being the more

persistent, and the latter, as pertaining to the individual merely, being but transient. He illustrates the feeling of *remorse* in this way:

> Swallows at the proper season seem all day long to be impressed with the desire to migrate; their habits change; they become restless; are noisy, and congregate in flocks. Whilst the mother bird is feeding or brooding over her nestlings, the maternal instinct is probably stronger than the migratory; but the instinct which is more *persistent* gains the victory, and at last, at a moment when her young ones are not in sight, she takes flight and deserts them. When arrived at the end of her long journey, and the migratory instinct ceases to act, *what an agony of remorse each bird would feel*, if from being endowed with great mental activity, she could not prevent the image continually passing before her mind of her young ones perishing in the bleak north from cold and hunger. (Vol. I., p. 87.)

And yet, shortly after, Mr. Darwin says "the essence of an *instinct* is that it is followed independently of reason." But can we attach any moral quality to an act that is performed "independently of reason?" A man may suffer an agony of sorrow at an accidental homicide, or some other act, it may be, merely instinctively performed independently of reason; but would there be no difference between this feeling and that which a rational being would experience after committing murder or any other deliberate crime? Mere regret for a misfortune can never develop into remorse for a crime. How did the law obtain its distinction between *malum in se* and *mala prohibita* except from the intuitive moral sense of mankind? Mr. Darwin lays much stress upon the social standard of the "Law of Honor." To this point a writer in the *Quarterly* puts a telling example of the principle that it is *judgment*, not *feeling* which has to do with right and wrong.

> What quality could have been more useful to social communities than courage? It has always been, and is still, greatly admired

and highly appreciated and is especially adapted, both directly and indirectly, to enable its possessors to become the fathers of succeeding generations. If the social instinct were the basis of the moral sense, it is infallibly certain that courage must have come to be regarded as supremely good, and cowardice to be deserving of the deepest moral condemnation. And yet what is the fact? A coward feels probably self-contempt and that he has incurred the contempt of his associates, but he does not feel "wicked." He is painfully conscious of his defective organization, but he knows that an organization, however defective, can not in itself, constitute moral demerit. Similarly, we, the observers, despise, avoid or hate a coward, but we can clearly understand that a coward may be a more *virtuous* man than another who abounds in animal courage. (*Quarterly*, July, 1871.)

Mr. Darwin speaks in several places of the standard of conscience—or the struggle of *instincts*—rising "higher and higher." Now what is it in us that enables us to *judge* of such "standards" in this way? How can we look at these questions from *without*, if we are but developed brutes, and all our faculties developed instincts? It is inconceivable that we should thus pass judgment upon ourselves, when self alone must be the highest "standard" we should know in the universe. Social instincts may lead to certain rules and customs: but they can never rise into the atmosphere of that moral sense which pronounces a judgment upon the secret motives of the individual, perhaps entirely different from the social verdict.

Mr. Darwin would appear in some cases to be guilty of a mere play upon words. Thus, he says "the imperious word *ought* seems merely (?) to imply the consciousness of the existence of a permanent instinct either innate or partly acquired, serving him as a guide, though liable to be disobeyed. We hardly use the word *ought* in a metaphorical sense, when we say hounds ought to hunt, pointers to point, and retrievers to retrieve their game. If they fail thus to act, they fail in their duty,

and act *wrongly!*" Why could not Mr. Darwin go on to explain what the hunter should mean when he says that his patent double-barrel, being properly constructed, *ought* to carry so many yards?

It is this plausible confusion of ideas, in very many instances, that serves the place of argument. Where did natural selection in the history of the race ever develop the principle of returning good for evil, and loving our enemies? And yet when propounded even to the moral sense of savages, there is that in man which recognizes the truth and beauty of the standard higher than human nature has practically attained. While Mr. Darwin traces the moral sense to social instincts, he founds the social instincts upon the parental or family affections: but as to the origin of these last, he expressly says "it is hopeless to speculate." It would have been more reasonable to reach that conclusion at an earlier stage of his hypothesis.

Philosophy must enter its protest against this very crude and unsatisfactory invasion by a mere naturalist of the realm of psychology and ethics. It can not be shown that we could ever have attained the perception, much less the comprehension, even of the material world, without some innate ideas logically antecedent to all sensation—ideas which place us above the material world, and enable us to analyze and judge of it. No stream can rise higher than its source. If man's mind is but a material evolution, there is nothing but mechanical motion in the universe, and no place for aught else. But volition, reflection, self-analysis, abstraction, the grasp of universals, spontaneous voluntary action and moral judgment—all these are *facts*—if not *phenomena* in the sense of the naturalist, they are *noumena* in the sense of the metaphysician. If the philosophers of old erred in interpreting nature by the light

of the human reason, it was a better mistake than attempting to interpret the human soul by mere physical laws, and making a "fetish" of natural science; as if there were not more things in heaven and earth than are dreamed of in the philosophy of mere naturalists.

In the zoölogical, psychological, and ethical analysis of man, Mr. Darwin's theory is found radically defective —notably in the last. There are few readers, it seems to us, who would not go along with Mr. Wallace in the inference which he draws from the facts that are not to be accounted for by Natural Selection, or hardly by any form of evolution:

> The inference I would draw from this class of phenomena is, that a *superior intelligence* has guided the development of man in a definite direction and for a special purpose, just as man guides the development of many animal and vegetable forms. The laws of evolution alone would, perhaps, never have produced a grain so well adapted to man's use as wheat and maize; such fruits as the seedless banana and bread-fruit; or such animals as the Guernsey milch-cow or the London dray-horse. Yet these so closely resemble the unaided productions of nature, that we may well imagine a being who has mastered the laws of development of organic forms through past ages, refusing to believe that any new power had been concerned in their production, and scornfully rejecting the theory that in these few cases a controlling intelligence had directed the action of the laws of variation, multiplication and survival, for his own purposes. We *know*, however, that this has been done, and we must therefore admit the possibility that, if we are not the highest intelligences in the universe, some *higher* intelligence may have directed the process by which the human race was developed, by means of more subtle agencies than we are acquainted with.—*Limits of Nat. Selec., &c.*

How Mr. Darwin can controvert this inference, we see not. He certainly should be the last to object to it; for his illustrations and his arguments for Natural Selection are all primarily drawn from the variations produced by man's intelligence in the breeding of ani-

mals under Domestication. The idea of an *unconscious* intelligent organizing force is unthinkable. If there is such a power under the phenomena of the world, it has all the characters of a personal will; and it is perfectly certain that at the extreme end of the minutest and most elaborate research, we are confronted with two principles which point to a Truth, which science may choose whether to embrace or to stop short of it: and those two principles are causality and the conservation of force: and that Truth is, the existence of a Personal Agent who operates the phenomena of the universe. If making the will a *cause*, after the analogy even of our own physical actions, is *anthropomorphism*, then what right have we to attempt *any* explanation of the phenomena around us, or what confidence can we have in such explanation? But if we know that we understand the phenomena as they *are*, by the same token we may believe that *we are made in the image of the Maker.*

CASE OF PIERCE.—PLEA, INSANITY.

What is Mania Transitoria? Who are Liable? How Should it Affect Jurisprudence?

BY S. T. CLARKE, A. M., M. D.

At a special term of Oyer and Terminer for Niagara County, N. Y., Daniels, Justice, the verdict "not guilty" having been rendered in the action of *The People vs. Aratus F. Pierce*, defended on the plea of insanity, (mania transitoria,) makes the foregoing questions pertinent at this time.

The writer of this article, having been called by the defence to listen to all the testimony in the case, after