



THE
LADIES'
REPOSITORY.
1871.

July.

ORIGIN OF SPECIES.

THE recent work of Mr. Darwin, "The Descent of Man," that has just appeared in this country, will serve to impart fresh interest to one of the most important scientific questions under discussion at the present day, namely, the *origin of species*.

This last and maturest work of Mr. Darwin was intended, until recently, by its author, to have been posthumous. We will not stop to inquire why this design was formed, or has been abandoned, but the appearance of the book is largely due to the increased tolerance of such views in these later times, as it is the avowed purpose of Mr. Darwin's work to inculcate. Careful students of his earlier writings will have been thoroughly prepared to anticipate this ultimate statement, especially if taken in connection with the copious literature to which the discussion as to the origin of species has given rise.

Whatever others may feel, we hail the appearance of Mr. Darwin's book with pleasure. We have no fear that in the end even Bible or religious truth will suffer. Again, whatever may be said of his doctrines or their consequences, we think no unprejudiced student of Mr. Darwin's writings will accuse him of entertaining purposes, or even a *spirit*, hostile to religion. We can not now enter on details at this point, but think it not a difficult one to establish. Beyond this, no one can fail to admire his patience, perseverance, caution, candor, in short, his scientific spirit and manner. We credit Mr. Darwin, and even Prof. Huxley, with being thoroughly honest, as well as learned and intelligent, and as having the good of their fellow-men at heart.

By these remarks, we would by no means be
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understood as recommending *indifference* as to the bearings of science on religion, least of all to the doctrines of Mr. Darwin or their consequences in this relation. But we do object to this fearful spirit some Christians exhibit in the presence of certain novel or startling scientific doctrines or facts. The Bible and Christianity, after having stood the tempests and fiery trials of eighteen hundred years, will not perish, but might even gather strength, so far as we can see, should it be *proved* men have descended from apes. Men are immortal all the same, and as Christians have but little time to spend looking down, looking *up* as they do to a higher estate, to the "recompense of reward." Though it should be proved that the human race *did* graduate out of apes somehow, or time, or place in the past, we have at least one circumstance to console us, namely, whatever we may do toward establishing affinities with apes, we are now so far from them in sympathy and kind as to be sure they will never set up a similar claim, or make a similar discovery on their part. The recognition of consanguinity will never be mutual, whether pleasant or unpleasant. Hence, the multifarious consequences that might otherwise arise, it rests alone with man to avoid.

But what is this "Darwinian Hypothesis" we hear so much about?

Hitherto we have sought in vain in Mr. Darwin's writings for a clear and compact statement of the doctrine in question. This arises from no want of lucidity in expression. For simplicity and clearness we know of no scientific writer that excels Mr. Darwin. After reading his works, one can have no doubt as to what his views are. But the lack of summary, neatly formulated general statements enhances the difficulty of a critical estimate. Perhaps we can not do better than trust Prof. Huxley for

its statement. He says, "As I apprehend it—for I have put into a shape more convenient for common purposes, than I could find *verbatim* in his book . . . given the existence of organic matter, its tendency to transmit its properties, and its tendency occasionally to vary, and lastly, given the conditions of existence by which organic matter is surrounded—then these put together are the *causes* of the *present* and the *past* conditions of *organic nature!*" (Origin of Species, p. 131, Am. Ed.)

To paraphrase this statement liberally, we may say—given the required elements, we may begin with the lowest animal, and from this by a species of improvement, or "evolution," carried on during long periods of time, may rise, for example, from radiates to mollusks, from mollusks to articulates, and from articulates to vertebrates; once with vertebrates begun, we get reptiles from fishes, birds from reptiles, quadrupeds from reptiles, or birds, quadrumanes from quadrupeds, and last of all, *men* from *apes*.

To show *how* this last step in the ascending progression took place, and to prove it did take place, is the intent of Mr. Darwin's last book. And this is a summary statement in plain language of the "Darwinian Hypothesis."

We suppose there can be no doubt as to the general intent or aim in this hypothesis as to the origin of species. It is that of a continuous progression, speaking in general terms, from the lower to the higher plants and animals.

The higher are derived from the lower. The proofs by which this view is supported may be divided into two classes, and may be regarded from two different stand-points. The two classes of proofs belong, one of them to the past, the other to the present. The one class of evidence is geological, the other belongs to the present period in the earth's history, or the period of man.

These proofs may be considered as Mr. Darwin has, beginning with the facts or particulars, and by careful inductive procedure advancing step by step to the most general conclusion. That conclusion is his "Theory of the Origin of Species," expressed in a single proposition.

Or, on the other hand, we may reverse the procedure and, beginning with the general statement, work backward, or endeavor to do so, analytically or deductively. This is not only a just procedure when once an inductive path has been opened between the facts or premises, and the conclusions, but is necessary, corresponding to the experiment or case called crucial in material proof.

Regarding this mode of examining the theory in question as valid, we propose to read from

the conclusion back to the premises, as, in the present state of the question, not only a summary but a satisfactory course. We propose to see whether we can get from conclusions back to the premises, as easily and plausibly as some have from the premises to the conclusion. It is an old but just adage, that "it is a poor rule that will not work both ways." The mode of examination we propose is, what may be called the logical, since it seeks to determine the adequacy or value of the proof in relation to the conclusion, nothing more.

We have endeavored to study the question under consideration in the best manner we could. Perhaps our study has been inadequate, but in the face of all the evidence brought up in support of the "Darwinian Hypothesis," we have been confronted, and we still are, with several difficulties. We do not offer them as new. But they deserve re-statement until they compel the attention they merit.

But before passing to a summary review of the evidence of the truth of the hypothesis in question, there are two points that demand attention.

1. It is one of the first rules to be complied with in all reasoning to define as exactly as possible leading terms. Without this no discussion can proceed definitely. This is especially true in cases where the subject-matter of the terms is greatly in dispute. About what term has there been greater controversy in these latter days than about that of "species," as to its real meaning? What is the thing it denotes? By what marks shall it be known and designated? How shall we know when we have a "species?" The original question has never been, "What is the origin of types?" as the radiate type, etc., but a more special, underlying one, "What is the origin of species?"

Now *what* is a "species?" The whole question stands or falls on what has been, or may be, done with "species." Any uncertainty that may exist as to what a species is in the beginning, will most assuredly not disappear in the reasonings, based on facts, which borrow their chief value from the assumption that we clearly understand what we are talking about when we use the term species. The reader might suppose by this time a scientific term, so long in use, must be well defined, its limits and contents agreed on. But the very reverse of this is true. We decline to state or examine the various definitions at this time that have been given by naturalists of the term in question, but we make bold to say no acceptable real definition of this term has ever been given. We do not say such a definition can be given,

least of all is it our intention to propose one. But until this shall be done, there must be, as there is, vagueness and obscurity hanging about all discussions which proceed on the sandy, shifting basis afforded by this term, or what it is presumed to denote. Before we dispute much further as to the "origin" of species, we had better stop and inquire more strictly what is denoted by our major term. We must have a clearer definition, qualitative or quantitative, before we can legitimately proceed. This is all the more so since the unmistakable tendency or aim of modern discussion, in one of its phases, is to free species, or our conception of them, from their most distinguishing characteristic; namely, persistence of plan, or type, in connection with wide variation.

Since this is the chief obstacle in the path of the transmutation theory, it is easy to see why it should be discredited or set aside. But when you have deprived a species of the characteristic just referred to, what have you but a variety? Once with species and varieties on the same level, calling a variety a species and *vice versa*, it is quite possible to render plausible, or even prove the "Darwinian Hypothesis."

From an examination of varieties called species, you get conclusions made to include real species without so much as consulting them. Now we hold ourselves ready to prove this has been often done, and that too frequently the "Darwinian Hypothesis" stands on no better foundation than this. Are we absolutely certain, for example, that in describing oaks under the generic name *quercus*, and the various different kinds as species under this genus, that our terms, as we have fixed their meaning, really express the truth of nature? Are we sure what is called the genus should not be called the species, in the common sense of this term, while what we call species should be called varieties? Have we not ministered to confusion by an inadequate or imperfect terminology? What is said of oaks must be repeated in hundreds of instances, in the plant and animal kingdoms. Has any body ever answered these questions in a satisfactory manner, so as to put reasonable inquiry at rest? Can it be said a decisive answer on this point is immaterial? But whatever uncertainty there may be concerning the questions stated above, there can be none on this one. Have we any evidence that either oaks or pines, for example, by any natural or artificial process whatever, have deserted, either upward or downward, an easily recognized type or plan, this as an oak, that as a pine, becoming something else than an oak or a pine, or that they have ever been changed,

the one into the other? Not the slightest evidence in the world, so far as we know. There have been wide and endless variations, but no deserts.

The same may be said, for example, for dogs and men. We have a genus *Homo*, and under this a number of varieties of the more permanent kind, because we have degrees in the permanence of varieties. Under the genus *Canis* are we sure the various species, so-called, are not mere permanent varieties? Have we ever known any member under this genus to transmute into another genus? However much dogs may differ as to size, color, hair, etc., do they not all conform pertinaciously to an easily recognized type, which they have never been known to desert for another?

If we do not admit this element of permanence of type or plan as a distinguishing mark of species, we degrade them to the rank of mere varieties, and once on this basis of sand there is no reliable ground on which for scientific investigation to rest, since it rests not till it has formed the underlying uniformities of the subject in hand. With species deprived of the element of permanence, you have nothing left as the tangible object or end of scientific research but an indefinite "tendency" to transmutation wholly at variance with many facts both positive and negative, and the conditions of which are in most cases unknown, in many unknowable.

It can not be said no distinction is customarily drawn between species and varieties, nor can it be said that distinction has been other than permanence of type in one, and the want of it in the other. But how shall we emancipate the fundamental type of a species, or even a genus, from the ever-changing disguises of its variations, and so describe it that we can detect it under the garb of its mutations? Here, then, are natural obstacles to clear definition, to be added to the artificial ones growing out of an imperfect terminology.

While we have this uncertainty in our knowledge as to what a species is, and a corresponding imperfection in definition of the leading terms we employ, how can we hope for accordant discussion or reliable conclusions, which some think they have? The difficulty just stated at some little length is the one that meets us at the very threshold of the inquiry, and, to our mind, has vitiated the whole course of discussion as to the origin of species. Until a definition has been drawn between species and varieties—if there be any—sufficiently clear for the purposes of critical discussion, the chance is all arguments in favor of the trans-

mutation of species are really drawn from the changes and interchanges of varieties. This is truly the state of the discussion to-day. We do not announce any new discovery as to the logical state of this question. Those best qualified to speak are freest to admit the difficulty, and in some cases practical impossibility, of distinguishing between species and varieties.

2. *As to the question of time.* One prime desideratum or condition in the "Darwinian Hypothesis" is time. It is said, to effect a conversion from one species to another requires long periods in time. The required changes take place so deliberately, and by such small gradations, that thousands of years may be necessary in which to produce the transmutation. There can be no objection to this demand. If this is all the "Hypothesis" needs it is welcome to it. But it is a demand that works both ways. If the friends of the hypothesis contend for immense, and we may say impracticable periods of time in which to produce and confirm the required changes, so, on the other hand, must we subject these so-called new species, artificially produced, to naturally favorable circumstances, and if, at the end of a few hundred or thousand years, the new peculiarities, or type, should persist in spite of variations, then we may certainly pronounce we have a new species, and not till then. How often would we find the so-called new species reverting back to the original type or parent stock? These remarks all proceed on the suppositions that we know what a species is, and that there have been cases of new species produced either naturally or artificially, which we heartily doubt. We know very well such a test as regards time would be complained of as unscientific and unreasonable. But no more complaints would deter us from applying it until it should be shown how it could be allowed in the other case and not in this one. Can it be said it is not the test to which all undoubted species, in the common sense of the word, have been actually subjected?

It is not enough that a so-called new species shall endure for a few years under favorable circumstances that tend to perpetuate new features, as in the numerous varieties of flowers, or fruits, or animals, obtained by careful domestication, cultivation, and selection. The element of time is just as necessary in proving as in procuring a new species. To this test oaks, pines, dogs, horses, and men have been subjected.

It is not a question of so much importance in case of mere varieties. They may be produced, or may relapse in comparatively brief periods in time. There are, as already said,

degrees in the permanence of varieties. There can be no question that the permanence of some varieties is such as to leave one in doubt whether they are not species. On the other hand, the power of species to vary differs in different cases. Some species may vary so readily under even slight influences, as to raise a just suspicion whether they are not simply strongly marked varieties.

We insist on the element of time for proving species, or a satisfactory reason why we can not have it. This point conceded us, however, two alternatives are presented to the "Darwinian Hypothesis." Either it must surrender the question of time altogether, or it must submit to have most, at least, of its strongest proofs held *sub judice*—bottled up for a few hundred or thousand years. Of course this could not be alleged against geological proofs of the "Hypothesis." But the reader will be surprised if he looks into these geological proofs to find how slender they are. We shall speak of them briefly in a subsequent article.

(TO BE CONTINUED.)

BERT'S WHISTLE.

THE hot, bright sun of a long July day sank out of sight behind the western hills, and a faint breeze sprang up, lifting the heads of the drooping flowers, and softly swaying the delicate vines that clambered from pillar to pillar of a broad piazza. Lured by the cooling breath the occupants of the pleasant country-seat had all gathered there, and were watching the rosy light fade away and the moon come up until all the lawn lay fair and still under its soft light, and the graveled walks grew white and glittering. Then began that wonderful chorus of insect voices that a Summer night calls forth, and the human audience, lulled into reveries by the sound, grew still—the younger ones seeing visions it may be, the older ones dreaming dreams.

A pretty picture they unconsciously formed—the gentlemen sitting in the clear light on the steps, and the ladies a little further back, where the vine-leaves threw changing, beautiful shadows over their pure white dresses. But the children, too young to take thought for the future, not old enough to have a past, grew weary of the silence presently, and began to tell each other marvelous stories of "once upon a time." Then they tried to imitate a distant whip-poor-will, and broke into peals of laughter at their ineffectual efforts to learn the locust's long song.

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SECOND PAPER.

REMEMBERING the wretched state of uncertainty there is attaching to the term "species," and what has been said in regard to the question of time, let us turn to the evidence by which the hypothesis of Mr. Darwin is supported. As we have already said, the evidence may be divided into two classes. One belongs to the past, geological; the other to the present, or historic period.

The whole evidence, however, may be included under the head of variation. This may be effected by external or internal circumstances or causes. Under the head of external circumstances favoring or causing variation we may mention climate, food, and the various circumstances connected with procuring it, etc. Under the head of internal circumstances would fall this so-called "tendency" to progressive development. But whether external or internal the result is variation, in the aggregate from some lower to some higher form, at least so says the "hypothesis." Then,

1. *Such evidences as are afforded by the present order or state of organic nature.*

The proof under this head is of two kinds, natural and artificial, or experimental. But it may all be considered, as already said, under the simple head of variation. This fact of variation is one of the plainest in nature. But whether by it we can explain how a higher species is derived from a lower, is a question. There are many ways by which variations are brought about. For example, by crosses. These may be either natural or artificial. Now we do not speak of crosses between mere varieties, but between species, if we know what they are. The crosses between mere varieties are beside

our case, unless it could be shown as a matter of fact, new species had been obtained in this way. We speak indeed of hybrids. But what is a hybrid? We will be told it is the offspring of a cross between two different species, as between the horse and the ass, the hybrid in this case being what we call a mule. But here comes in one out of a multitude of bad consequences, arising from an imperfect understanding as to what a species is. If you get a cross between two different species, which all would agree to call species, the hybrid is sterile, as in the case of the mule. But if you get a cross between what some would call different species, and others different varieties, your so-called hybrid may be fertile. Plainly, these two cases are not alike, still some use them in reasoning as if they were.

Now in the case of crosses several material circumstances have never been satisfactorily explained by the supporters of the "Darwinian Hypothesis." Among these we would mention: Why crosses between generally admitted species are as a rule sterile. Why crosses between mere varieties are as a rule fertile. Whether fertile crosses between doubtful species do not mark them as simply permanent varieties. How we shall explain the total impossibility of getting fertile crosses between some closely allied species, as the horse and ass, or of getting a cross of any kind between others, and more especially when it is remembered that the embryos of most animals appear to begin much alike. Whether undoubted hybrids, if fertile, can maintain themselves through successive generations without the aid of, and without relapsing toward the parent stocks. These are not new questions, but until they are satisfactorily answered, which they never have been, they are good as new ones. Doubtless we shall be told,

because we have not toiled in this department as long as Professor Huxley or Mr. Darwin, we are thoroughly incompetent as judges in the case. This is a common way of stopping the mouth of inquiry as well as ignorance. But in all humility, we announce ourselves ready to discuss the question in detail when it appears necessary to do so.

Again, variation is brought about by selection, both artificial and natural. We may speak of the latter more at length if it shall seem necessary below. Variation of either kind we gladly admit, but challenge the proof that any species—or whatever else you may call them—as distinct from each other as oaks from pines, or the pea from the bean, or as wheat from oats, or dogs from monkeys, or as monkeys from men, have ever varied, so as to transmute, gradually or otherwise, dogs into monkeys, or monkeys into men.

Then as regards hybrids, in a state of nature they are exceedingly rare. But suppose it were otherwise, the fact of hybridism explains nothing really, especially if the hybrids are sterile. Because before hybridism can come into play you must have two distinct species at least to begin with. The difficulties of the case are all over before you can invoke its aid. The fact of variation is admitted; the only real point in controversy is as to the limits within which it operates. These limits, if such there be, when they are ascertained will be the defining lines of true species. Need we insist that until they are discovered there can be no sound accord in discussion?

Occasional monsters or "freaks of nature" do occur, but beyond these we have found no cases, even in Mr. Darwin's writings, that show a "transmutation" to have been effected between individuals or classes of animals as distinct from each other as monkeys from men. But farther: the variations that have been brought to pass among plants and animals under domestication, are generally such as can only take place in this way. They are rarely or never found in nature. But in the "Darwinian Hypothesis" variations under domestication are employed in reasoning as if they were variations truly natural. But beneath or beyond all such subordinate considerations, we remark that natural or artificial, or any other kind of selection, whether in the past or present, can not account for the origin of species. It only accounts for the preservation or perpetuation of this, or the destruction or disappearance of that form, or species, or variety, or type—only this and nothing more. It leaves wholly untouched the question as to how this form or that came to be

what it was and is. The whole weight of selection misses the point at issue. This is no mere verbal quibble or vain objection. If any one can really see more in this case of natural selection in behalf of the "origin" of species, we should be obliged to them to point it out.

2. We here turn to a consideration of the geological evidences of the truth of the "Darwinian Hypothesis." We do not propose more than a glance at some of the salient features in the case.

Here again, as in the former case, we look for evidence of variation. This geological side of the question is a peculiarly happy one. It has never been tampered with by either the friends or foes of the "Darwinian Hypothesis." It tells an impartial tale without fear or favor. It is quite as impressive in its silence as when it speaks; as potent and as much deserving of attention in its negative as in its positive moods.

Now what evidence is there from this source that classes as distinct from each other as men from monkeys have ever been transmuted by "variation" from the lower into the higher? The transition from one class to another must have been gradual, and the distinct claim is that it was so. Now it is an old objection, we know, that this impartial, imperishable record ought to show some of the transition links, or intermediate terms in the progression, but old or new it has never been answered, and it can never be except by finding the missing links. This is not a question of opinion but of fact. The opinions of all the scientific men in the world are worth nothing in the face of such powerful negative testimony, none the less so because negative. It is hardly necessary to reiterate what every one knows, that such links have never been found. The only possible explanation that can be given in regard to their absence is, that they never existed. If they had existed no reason can be given why they should now be absent when the remains of the groups they connected are so abundant. We can not understand how the supporters of Mr. Darwin's hypothesis can pass along so cheerfully and complacently as they do over or past such an obstacle as this. They assert in the most hopeful and confident manner, though they have not been found, these connecting links will be some day. This may not be done in Mr. Darwin's day, and may not be, indeed, for several hundred years to come; but, strong in scientific truth, they can afford to wait. We assert, not one solitary case has ever been found in the geological record that truly and directly supports Mr. Darwin's hypothesis as to the "origin of species."

We now turn to another difficulty that has always stood in the way of accepting this hypothesis. It can not be denied, and it need not be, that there is an instructive and interesting increase in the number and complexity of types, as we ascend the geological series, from the oldest to the most recent formations. We now put out of sight the question as to whether the true chronological order of formations has been accurately determined. But the point I now call attention to, is not the order of types, but their persistence. The most perfectly graduated, progressive order in the types of organized beings—if it were shown, as it never has been—could not do more than lend a strong presumption in favor of the "Darwinian Hypothesis," or against the "special creation hypothesis." The case would be conformable to either view.

The fundamental postulate in the "Darwinian Hypothesis" is that of a "tendency to progressive and continuous variation and modification from lower to higher forms in the plant and animal kingdom." And it is not the "tendency" simply, but the fact, that is insisted on.

Now we do not know whether it may have appeared to many others as it does to us. But the more we try to reconcile the postulate above mentioned, with the fact of persistence of types, the more irreconcilable do they seem.

We have said the fact of persistence. What evidence have we that types have persisted during the long lapse of time, since the earth first became peopled with living beings? On this point we had already collected evidence, when we fell in with Professor Huxley's address before the Geological Society of London, and which is published in the recent volume entitled "Lay Sermons and Addresses." In it we found certain statements which we employ instead of our own. 1. Because they are so much more full and satisfactory, and because of the acknowledged ability of Professor Huxley. 2. Because they are from the most conspicuous supporter of Mr. Darwin's views. But here they are:

"We are all accustomed to speak of the number and the extent of the changes in the living population of the globe, during geological time, as something enormous; and indeed they are so, if we regard only the negative differences which separate the older rocks from the more modern, and if we look upon specific and generic changes as great changes, which, from one point of view, they truly are. But leaving the negative differences out of consideration, and looking only at the positive data furnished by the fossil world from a broader point of view—from that of the comparative

anatomist, who has made the study of the greater modifications of animal forms, his chief business—a surprise of another kind dawns upon the mind; and under this aspect the smallness of the total change becomes as astonishing as was its greatness under the other.

"There are two hundred known orders of plants; of these not one is certainly known to exist exclusively in the fossil state. The whole lapse of geological time has as yet yielded not a single new ordinal type of vegetable structure. (Hooker.)

"The positive change in passing from the recent to the ancient animal world is greater, but still singularly small. No fossil animal is so distinct from those now living as to require to be arranged even in a separate class from those which contain existing forms. It is only when we come to the orders, which may be roughly estimated at about a hundred and thirty, that we meet with fossil animals so distinct from those now living as to require orders for themselves; and do not amount, on the most liberal estimate, to more than about ten per cent. of the whole.

"There is no certainly extinct order of *Protozoa*; there is but one among the *Celenterata*—that of the rugose corals; there is none among the *Mollusca*; there are three, the *Cystidea*, *Blastoidea*, and *Edrioasterida*, among the *Echinodorms*; and two, the *Trilobita* and *Euryptorida*, among the *Crustacea*—making altogether five, for the great sub-kingdom *Annulosa*. Among vertebrates there is no ordinarily distinct fossil fish. There is only one extinct order of *Amphibia*—the *Labyrinthodonts*; but there are at least four distinct orders of *Reptilia*; namely, *Ichthyosauria*, *Plesiosauria*, *Pterosauria*, *Dinosauria*, and perhaps another or two. There is no known extinct order of birds, and no certainly-known extinct order of mammals, the ordinal distinction of the '*Toxodontia*' being doubtful."

Proving the extinction of species or orders has of course no direct bearing, if any, on the question of their origin. Such statements are valuable only for our present purpose, when they enable us to see how few species or orders have become extinct, as compared with those that persist. Now as regards those species or orders that have persisted, Professor Huxley says, referring to the observations of another:

He stated, on the authority of Dr. Hooker, that there are carboniferous plants which appear to be generically identical with some now living; that the cone of the oölitic *Araucaria* is hardly distinguishable from that of an existing species; that a true *Pinus* appears in the *Pur-*

becks, and a *Juglans* in the chalk; while from the Bagshot sands, a *Banksia*, the wood of which is not distinguishable from that of species now living in Australia, had been obtained.

Turning to the animal kingdom, he affirmed the tabulate corals, of the *Silurian* rocks, to be wonderfully like those which now exist, while even the families of the *Aporosa* were all represented in the older Mesozoic rocks.

Among the *Mollusca* similar facts were adduced. Let it be borne in mind that *Aricula*, *Mytilus*, *Chiton*, *Natica*, *Patella*, *Trochus*, *Disconia*, *Orbicula*, *Lingula*, *Rhynchonella*, and *Nautilus*, all of which are existing genera, are given without a doubt as *Silurian* in the last edition of the "*Siluria*," while the highest forms of the highest *Cephalopods* are represented in the *Lias* by a genus, *Belemnontentis*, which presents the closest relations to the existing *Loligo*.

The two highest groups of the *Annulosa*, the *Insecta* and the *Arachnida*, are represented in the coal, either by existing genera, or by forms differing from existing genera in quite minor peculiarities.

Turning to the *Vertebrate*, the only *Paleozoia Elasmobranch* fish, of which we have any complete knowledge, is the *Devonian*, and carboniferous, *Pleura Canthus*, which differs no more from existing sharks than these do from one another.

Again, vast as is the number of undoubtedly *Ganoid* fossil fishes, and great as is their range in time, a large mass of evidence has recently been adduced to show that almost all those respecting which we possess sufficient information, are referable to the same subordinal groups as the existing *Lepidosteus*, *Polypterus*, and sturgeon, and that a singular relation obtains between the older and younger fishes; the former the *Devonian Ganoids*, being almost all members of the same suborder as *Polypterus*, while the *Mesozoic Ganoids* are almost all similarly allied to *Lepidosteus*.

Again, what can be more remarkable than the singular constancy of structure preserved throughout a vast period of time by the family of the *Pycnodonts* and by that of the true *Coelacanth*s—the former persisting with but insignificant modifications from the carboniferous to the tertiary rocks inclusive; the latter existing with still less change from the carboniferous rocks to the chalk inclusive?

Among reptiles, the highest living group, that of the *Crocotilia*, is represented at the early part of the Mesozoic epoch by species identical in the essential characters of their organization with those now living, and differing from

the latter only in such matters as the form of the articular facets of the vertebral centra, in the extent to which the nasal passages are separated from the cavity of the mouth by bone, and the proportions of the limbs.

And even as regards the *Mammalia*, the scanty remains of *Triassic* and *Oolitic* species afford no foundation for the supposition that the organization of the oldest forms differed nearly so much from some of those which now live as these differ from one another.

"It is needless," he continues, "to multiply these instances. Enough has been said to justify the statement, that, in view of the immense diversity of known animal and vegetable forms, and the enormous lapse of time, indicated by the accumulation of fossiliferous strata, the only circumstance to be wondered at is, not that the changes as exhibited by positive evidence have been so great, but that they have been so small."

After these remarkable statements, Professor Huxley takes each great division of the animal kingdom, and in a more summary but not less satisfactory manner, reaches the same conclusion as in the former case, which we here present in his own words, not only for its truthfulness, but because of its applicability to our question:

"These examples might be almost indefinitely multiplied, but they are sufficient to prove that the only safe and unquestionable testimony we can procure—positive evidence—fails to demonstrate any sort of progressive modification toward a less embryonic or less generalized type in a great many groups of animals of long-continued geological existence. In these groups there is abundant evidence of variation—none of what is ordinarily understood as progression; and if the known geological record is to be regarded as even any inconsiderable fragment of the whole, it is inconceivable that any theory of a necessarily progressive development can stand, for the numerous orders and families cited afford no trace of such a process."

Or further on and more comprehensively he sums up the whole matter:

"What, then, does an impartial survey of the positively ascertained truths of paleontology testify in relation to the common doctrines of progressive modification, which suppose that modification to have taken place by a necessary progress from more to less generalized types, within the limits of the period represented by the fossiliferous rocks? It negatives those doctrines; for it either shows us no evidence of any such modification, or demonstrates it to have been very slight; and as to the nature of

that modification, it yields no evidence whatever that the earlier members of any long-continued group were more generalized in structure than the later ones."

Can it be possible these are the utterances of Professor Huxley, who wrote his "Origin of Species" and "Man's Place in Nature," in the direct interest of the "Darwinian Hypothesis?" Can it be possible he is unaware of the logical consequences of these honest, fervent statements in relation to the "Darwinian Hypothesis?" Could any more convincing and emphatic negation of that hypothesis be given? Can it be said after this that "the geological record as a whole" supports the hypothesis in question? Can we esteem the bearings of this great fact of the persistence of types on the "Darwinian Hypothesis," through untold ages in time, and in spite of the remarkable mutations the earth has manifestly undergone since the first fossiliferous rocks were deposited, and in spite of numberless variations—can we esteem it a slight matter? Whatever others may say, we say *no*. To our minds this hypothesis derives not the slightest real support from the geological record. Aside from the great classes of evidence already referred to, what have we that can lend real help to the "Darwinian Hypothesis?" None, so far as we know, except such as may be derived from comparative anatomy. We have just quoted a deliberate expression from Professor Huxley, made from the stand-point of the comparative anatomist. But, however interesting this kind of evidence may be—and it is among the best—we are prepared to say it does not exceed, if it equals, in logical value that already referred to.

We do not undertake to assert the "Darwinian Hypothesis" may not prove true in the future. But we do assert, without the slightest fear of successful contradiction, that as the evidence now stands the hypothesis not only is unproved, but has to face a mass of counter evidence, positive and negative, which there seems to be no other way to conciliate or satisfy except by a bodily surrender.

THE great means of guarding against the errors which surround us, is the diligent, obedient, devout study of God's Word. Errors in doctrine, errors in practice, errors which are floating in the atmosphere in which we live, and which nothing but familiarity with God's Word, and having our minds impregnated with it, will preserve us from imbibing. Only let us remember that it is not merely head-knowledge that we want, but such as is needed by the heart.

DOWN IN A COPPER MINE.

FOR a week or more I had been wandering about in the strange, wild region of the upper peninsula of Michigan, usually known as Lake Superior. First I had spent a few days at Negaunee and Ishpeming, among the iron mines, where some of the richest ores are found, and some of the best metal in the world is made; where the supply seems inexhaustible, and where, though most of the ore is sent away to be manufactured into pigs elsewhere, yet the small number of furnaces now in operation in the immediate vicinity consume in the aggregate the fuel furnished by forty-eight acres of average wood-land every week. From Negaunee I had gone to Marquette, down the inclined plane of the railway, descending a thousand feet in about thirteen miles. A steam-boat sail by night brings us with the early morning to the long, narrow, crooked inlet known as Portage Lake, lying low down between two ranges of hills which crowd close together as if grudging room for the lake, which, nevertheless, manages to spread itself out pretty broadly in places, and to stretch itself so nearly across the Keweenaw Peninsula that the government is constructing a canal at the westerly extremity to connect it with Lake Superior, and so make a short cut for vessels and steamers doing business in these northern waters. A stop of two days at Haughton and Hancock, villages of some importance, and fastened somehow curiously on the sides of the hills facing each other, with the narrow lake between, had begun to familiarize me with the copper mining business, as here we just fairly enter into the copper region. There are some half a dozen large mines in the immediate vicinity, and others not far off. From Hancock to Eagle River is a not very long day's ride, but over a fearfully rough road most of the way in rude coaches, but with good-natured though not very pious drivers, who are yet very generous in offering to treat their passengers at every little log tavern where they stop to water their horses and quench their own thirst. The country is not thoroughly subdued, and has a kind of defiant air, as if it considered itself, on the whole, superior to any civilization which had yet invaded it. We passed through several mining settlements, most of them now abandoned; for out of more than a hundred mines that have been opened and worked, only about a dozen are now in operation. The demand for copper is comparatively small; and though the deposits here are probably richer than almost anywhere else in the world, yet the expense is so great that it requires a very rich