

present in the air must have been far greater than at present.

It has been in vain, thus far, that men have attempted to lift the veil which conceals the beginning of life upon the earth. It would not befit me to express an opinion on the controversy whether the possibility of spontaneous generation has, or has not, been experimentally verified. That is a question on which experts alone can give an opinion worth listening to; and all that can here be noted is that experts are not agreed upon the subject. As a mere speculation it may be suggested that, somewhat as the elements when freshly released from chemical combination show for a short time an unusual readiness to enter into new combinations, so it may be possible that, when the earth was fresh from the baptism of liquid fire to which her primeval surface had for ages been exposed, certain of the substances existing on her surface were for the time in a condition fitting them to pass to a higher order of existence, and that then the lower forms of life sprang spontaneously into existence on the earth's still throbbing bosom. In any case, we need not feel hampered by religious scruples in considering the possibility of the spontaneous generation of life upon the earth. It would be straining at a gnat and swallowing a camel, if we found a difficulty of that sort *here*, after admitting, as we are compelled by clearest evidence to admit, the evolution of the earth itself and of the system to which the earth belongs, by purely natural processes. The student of science should view these matters apart from their supposed association with religious questions, apart in particular from interpretations which have been placed upon the Bible records. We may be perfectly satisfied that the works of God will teach us aright if rightly studied. Repeatedly it has been shown that ideas respecting creation which had come to be regarded as sacred because they were ancient, were altogether erroneous, and it may well be so in this matter of the creation of life.*

* It is not for me to undertake to reconcile the Bible account of creation with the results which science is bringing gradually more clearly before us. It seems to me unfortunate, in fact, that such reconciliation should be thought necessary. But it must be conceded, I suppose, by all, that it is not more difficult to reconcile modern biological theories of evolution with

Whatever opinion we form on these points, it seems probable that vegetable life existed on the earth before animal life, and also that primeval vegetation was far more luxuriant than the vegetation of our own time. Vast forests were formed, of which our coal-fields, enormous as is their extent, represent merely a small portion preserved in their present form through a fortuitous combination of exceptional conditions. By far the greater portion of those forest masses underwent processes of vegetable decay effectually removing all traces of their existence. What escaped, however, suffices to show the amazing luxuriance with which vegetation formerly thrived over the whole earth.

In assuming the probability that vegetable life preceded animal life, I may appear to be opposing myself to an accepted palæontological doctrine, according to which animal and vegetable life began together upon the earth. But I would remind you that the actual teaching of the ablest, and therefore the most cautious, palæontologists on this point, amounts merely to this, that if the geological record as at present known be assumed to be coeval with the commencement of life upon the globe, then animals and plants began their existence together. In a similar way the teachings of geology and palæontology as to the nature of the earliest known forms of life and as to the succession of faunæ and floræ, depend on an admittedly imperfect record. Apart, however, from this consideration, I do not think it would serve any useful purpose if I were to attempt, I will not say to discuss, for that is out of the question, but to speak of the geological evidence respecting that portion of the past history of our earth which belongs to the interval between the introduction of life upon the surface and the present time. In particular, my opinion on the interesting question whether *all* the forms of life upon the earth, including the various races of man, came into being by processes of evolution, could have no weight what-

the Bible record, than it is to reconcile with that record the theory of the evolution of the solar system. Yet strangely enough many oppose the biological theories (not without anger), who readily admit that some form or other of the nebular hypothesis of the solar system must be adopted in order to explain the peculiarities of structure presented by that system.