

separated by a valley from my house. Every flash I observed was double, composed I imagine of an ascending and descending current. In every instance one of the two flashes was brighter than the other; but I could detect no difference of time; as far as the eye could judge they were simultaneous. The inference I am disposed to draw from these facts is this, that during thunderstorms ascending currents are to be guarded against no less than descending ones; that when chimney-pieces are shivered and people sitting by the fire-side are killed, the electric fluid has not come down the chimney at all, but has proceeded from the earth, and, having found a good conductor in the fender and grate, has passed through them harmlessly, and has then overflowed, so to say, into the room, or shattered the non-conducting masonry. Continuous lightning-conductors, on Sir Snow Harris's principle, afford sufficient protection to public buildings, but metal pinnacles terminating below in masonry or woodwork are likely to cause mischief, and iron pillars, unless insulated below by some non-conducting substance, must be equally objectionable.

C. A. JOHNS

SIR WILLIAM THOMSON ON THE LAW OF BIOGENESIS AND THE LAW OF GRAVITATION

A PASSAGE in the address of the President of the British Association appears to me so remarkable, and so much at variance with the notions entertained by biologists of various shades of opinion, that I am surprised that no observations were made upon it during the sectional meetings, and beg now to draw attention to it. I may mention that in the discussion on spontaneous generation in Section D on the last day of the meeting, I did say substantially what I now write to you, but no one present defended Sir William Thomson's position. The passage in question is as follows: "But science brings a vast mass of inductive evidence against this hypothesis of spontaneous generation, as you have heard from my predecessor in the Presidential chair. Careful enough scrutiny has, in every case up to the present day, discovered life as antecedent to life. Dead matter cannot become living without coming under the influence of matter previously alive. This seems to me as sure a teaching of science as the law of gravitation. . . . I confess to being deeply impressed by the evidence put before us by Prof. Huxley, and I am ready to adopt as an article of scientific faith, true through all space and through all time, that life proceeds from life, and from nothing but life."* In the first place it is to be remarked upon this passage, that the reference to his "predecessor in the Presidential chair," and to "the evidence put before us by Prof. Huxley," is made in such a way as would lead an uninformed person to suppose that not only was the speaker simply availing himself of that evidence, but also merely following or re-enunciating a belief previously expressed by Prof. Huxley. This I do not for a moment suppose was in any way the meaning of Sir W. Thomson, who unintentionally has made it appear that Prof. Huxley comes to the same conclusion from the consideration of certain facts, as he does. So far from this reassuring concord having an existence, I doubt if any single biologist of name (of whatever philosophic tendencies) would venture to assert that it is as sure a teaching of science as the law of gravitation that dead matter cannot become living without coming under the influence of matter previously alive, and conclusions derived from a consideration of a vast series of facts prohibit an evolutionist from accepting such a doctrine without the most complete and widely-reaching evidence in its favour. Sir William Thomson's authority must be accepted as unquestionable as to the amount of sureness which may be attributed to the law of gravitation; but with great deference to him, I should like to ask if he would definitely maintain that it is no

greater than that which may be attributed to the dogma "no life except from life." It is the fact that within human observation the law of gravitation is a true statement; it is also the fact that within human observation the dogma "no life except from life" is a true statement; but how can it be for a moment supposed that this places the two statements in the same position of sureness? Does not all depend on that term "within human observation?" Will not the sureness depend on the extent and thoroughness of the observation? And is it not the case that whilst human observation of bodies in relation to the law of gravitation is of the most vast character—embracing not only all varieties of terrestrial matter, but innumerable extra-terrestrial bodies—the human observation of the way in which living matter originates or grows, is a mere trifle so insignificant in extent that it is as a drop in the ocean? Sir William Thomson speaks of being "deeply impressed by the evidence put before us by Prof. Huxley," and is thereupon ready to adopt an article of scientific faith "true through all space and time." What was the evidence in question? The merest fragment, as Prof. Huxley would himself acknowledge (though associated with much more evidence upon allied matters)—simply this by no means astonishing though much controverted fact, that when out of the unspeakably many kinds of mineral matter which you might take, you take one or two and boil them and seal them up and submit them to a variety of processes, the object of which is not to produce favourable conditions for the evolution of life, but to prevent the access of already living matter—you don't get life produced. The whole of this kind of experiment, and of the evidence which so much impressed Sir William Thomson, cannot—attended as it is with negative results—have anything to do with the general question of the *de novo* origin of living matter. Such evidence merely relates to a particular supposed case of such origin, one out of thousands conceivable. Yet this is what it seems to me—I write with diffidence—Sir William Thomson has taken as evidence of the same value as that on which rests the law of gravitation. Because it seems rather more probable than not that organisms do not arise *de novo* in boiled and sealed solutions of tartrate of ammonia, in hay-decoctions and turnip-juice, *therefore* it is true through all space and all time that dead matter never becomes living without the action of living matter; therefore nowhere to-day on the whole earth—in the sea charged with gases, open to sunlight and atmosphere, holding salts and complex semi-organic compounds, suspended and in solution—is this process going on; in no pond; under no moss; and not only to-day, but we are to conclude that never at any time did Nature in her great laboratory produce life from mineral matter, because in certain arbitrary, crude, and utterly artificial conditions of isolation she refuses to do so. Is it true that the law of gravitation is no surer a teaching of science than the dogma about the origin of life which rests on such logic?

That I have not misrepresented the utter poverty of observation upon the origin of life will, I believe, be admitted by all naturalists—possibly individuals unacquainted with biological phenomena may have conceived it to have been relatively more extensive. We have been able to trace the commencement of so many of the various living forms to eggs, that it becomes waste of time to examine into cases of alleged spontaneous origin of *complex* forms from mineral matter; and biologists have now to look for the formation of simple organic material. Observations therefore which merely tend to disprove the spontaneous productions of maggots, worms, ciliated infusoria, and fungi, are not to be reckoned as "evidence on the origin of life," they do not bear on the question as it now presents itself, the working hypothesis of science being, not that *animals* or *plants* originate *de novo*, but that *organic matter* has at one time done so, and is doing so still. It is, I believe, just to assert that observation bearing on this hypothesis is almost entirely wanting, and

* NATURE, Vol. iv., p. 269

indeed, the few experiments of the French observers, and of Gilbert Child and Bastian in this country are the only ones at present made.

The reason is obvious, the conditions of the experiment and observation required are so difficult that we have not yet mastered them. They are first, to ensure all the favouring circumstances in the laboratory experiment which natural stations afford, and, of course, to ensure them it is necessary to know or have some idea (which biologists have not) as to what they may be; second, to exclude simultaneously all living matter; third, to make the observations *throughout* with the greatest minuteness which the microscope permits—a necessary condition, on account of the possible smallness of particles of living matter. When we have had experiments performed in this way with a vast variety in the first-named set of conditions, so as to obtain and study the action of various natural circumstances which might possibly be present in the *de novo* origination of living from mineral matter—then we may speak of evidence on the question. As it is, we have but a very incomplete and discordant series of observations on one class of conditions in which there is a presumption of spontaneous generation (the case of Bacterium), and which have been selected for experiments on account of a supposed facility for isolation, without interference with the conditions, but of which very little is understood at all. I venture to submit that this single case, in which there has been some little investigation with, be it granted, negative result, so far from warranting the enunciation of a dogma, which is declared to be as sure as a great law expressing the concurrence of almost infinitely numerous, varied, and reiterated observations, does not even justify an opinion; it has no possible bearing upon the source of the minute protoplasmic particles which the microscopist finds abundantly in sea-water, nor upon the origin of the atmospheric germs which are so largely invoked by some persons. It leaves us necessarily to *a priori* considerations in regard to the origin of life on the earth, and until direct researches are made, the hypothesis developed by a *a priori* argument must have far more claim on the adhesion of an unbiassed mind, than a pseudo-law, though the latter bear an authority so great in some departments of science as is that of Sir William Thomson.

E. RAY LANKESTER

RECENT FRENCH ZOOLOGICAL DISCOVERIES

TWO naturalists, who have been more than usually successful in their investigations of the faunas of distant and little-known countries, have recently returned to France, and are now engaged in working out the results of their arduous expeditions. These are M. le Père Armand David, and M. Alfred Grandidier.

M. le Père Armand David is a missionary priest of the Order of Lazarists, who was for many years resident at Peking. Here he devoted much time and attention to the fauna of the surrounding country, which was at that period little known, and entering into communication with the authorities of the Jardin des Plantes of Paris, supplied that establishment with many interesting novelties. Amongst these one of the most remarkable was a new deer with very peculiar horns and a long tail, which was named by M. Alphonse Milne-Edwards *Elaphurus davidianus*, after its indefatigable discoverer. But about two years ago Father David moved the seat of his investigations into still more promising quarters. It was, we believe, the magnificent new species of Pheasants transmitted by Bishop Chauveau from Ta-tsién-leou—a town in Western Szechuen upon the frontiers of Tibet—that first called his attention to the probable richness of this district in other departments of zoology. Nor have his expectations been in any way disappointed. The collections of Mammals, Birds, and Reptiles, obtained by Father

David during the recent exploration of *Mopin*, as this portion of the Celestial Empire is termed by the French writers, have of late years seldom been equalled in any part of the world for extent or variety. The fauna of these mountains seems to be a sort of *pendant* to that of the Himalayas, which, some years ago, was so successfully investigated by Mr. Hodgson. The singular *Ælurus* or Wah, of Nepal, is replaced by a larger and even stranger form, the *Æluropus* of M. Milne-Edwards, a large bear-like mammal, quite distinct from anything previously known. A long-haired monkey inhabits the pine forests, remarkable for the development of its nose, which the same naturalist has proposed to name *Rhinopithecus*. The *Takin* of the Mishnees of Upper Assam (*Budorcas taxicolor*) is represented by a second species of this most singular genus of Ruminants. A new form of Cervidæ is remarkable for its small horns and well-developed canines; and there are a host of interesting novelties belonging to the insectivorous and rodent orders in Père David's series. In birds, M. Jules Verreaux, to whom the working out of this part of M. David's collections has been assigned, has already discriminated upwards of thirty new species. Amongst these many belong to the remarkable genera discovered by Mr. Hodgson in the hill-forests of Nepal, and hitherto unknown to occur elsewhere. Perhaps the most noteworthy of them is a small Passerine form allied to *Paradoxornis*, which has only three toes, a phenomenon hitherto unknown, in that typical order of birds. The Reptiles and Batrachians obtained by Father David in Moupin are also said to contain many novelties. Since the lamented death of Prof. Duméril, their investigation has, we believe, been undertaken by Prof. Blanchard, who has within these few last days brought before the French Academy a notice of one of the most extraordinary animals of the latter group. This is no other than a gigantic aquatic Salamander allied to, but distinct from, the now well-known *Sieboldia maxima*, of Japan. The discovery of this form of life in continental Asia is a fact of the highest significance as regards geographical distribution, as it was previously believed to be in the present epoch confined to the Japanese Islands, though remains of a closely allied animal (*Andrias scheuchzeri*) are found in the tertiary freshwater deposits of Central Europe.

We have mentioned only a few of the principal discoveries of M. David, but enough has been said to show the importance of the additions he has made to zoological science, and to heighten the interest attaching to the complete investigation of the fauna of the Chinese frontier of Tibet, which this distinguished naturalist has thus inaugurated.

While Father David has been labouring among the snows of Central Asia, another not less arduous devotee of science has been risking his life in the tropical forests of Madagascar, and has likewise made many brilliant discoveries. M. Alfred Grandidier, who has now returned from, we believe, his *third* voyage of discovery in that strange island, has shown that the riches and eccentricities of its fauna have not yet been exhausted. His collections, which have only reached the Jardin des Plantes very recently, although brought to France before the political storm of last autumn commenced, have not yet been fully examined. But they are said to contain very full series of several species of Lemuridæ, the comparison of which is likely to lead to important results, besides examples of a new genus of Rodentia, and many other Mammals of high interest. M. Grandidier has also paid much attention to the fossil deposits of Southern Madagascar, which contain the remains of the extinct gigantic bird, *Æpyornis maxima*, and has arrived at some important results (such as the former presence of *Hippopotamus* in Madagascar) which may ultimately tend to modify some of the views generally held concerning the true nature of the fauna of this island and its origin.

P. L. S.