I

ON THE METHOD OF ZADIG

[1880]

RETROSPECTIVE PROPHECY AS A FUNCTION OF SCIENCE

"Une marque plus sûre que toutes celles de Zadig."—CUVIER.[1]

IT is an usual and a commendable practice to preface the discussion of the views of a philosophic thinker by some account of the man and of the circumstances which shaped his life and coloured his way of looking at things; but, though Zadig is cited in one of the most important chapters of Cuvier's greatest work, little is known about him, and that little might perhaps be better authenticated than it is.

It is said that he lived at Babylon in the time of King Moabdar; but the name of Moabdar does not appear in the list of Babylonian sovereigns

[1] "Discours sur les révolutions de la surface du globe." *Recherches sur les Ossemens Fossiles*, Ed. iv. t. i. p. 185.

brought to light by the patience and the industry of the decipherers of cuneiform inscriptions in these later years; nor indeed am I aware that there is any other authority for his existence than that of the biographer of Zadig, one Arouet de Voltaire, among whose more conspicuous merits strict historical accuracy is perhaps hardly to be reckoned.

Happily Zadig is in the position of a great many other philosophers. What he was like when he was in the flesh, indeed whether he existed at all, are matters of no great consequence. What we care about in a light is that it shows the way, not whether it is lamp or candle, tallow or wax. Our only real interest in Zadig lies in the conceptions of which he is the putative father; and his biographer has stated these with so much clearness and vivacious illustration, that we need hardly feel a pang, even if critical research should prove King Moabdar and all the rest of the story to be unhistorical, and reduce Zadig himself to the shadowy condition of a solar myth.

Voltaire tells us that, disenchanted with life by sundry domestic misadventures, Zadig withdrew from the turmoil of Babylon to a secluded retreat on the banks of the Euphrates, where he beguiled his solitude by the study of nature. The manifold wonders of the world of life had a particular attraction for the lonely student; incessant and patient observation of the plants and animals

about him sharpened his naturally good powers of observation and of reasoning; until, at length, he acquired a sagacity which enabled him to perceive endless minute differences among objects which, to the untutored eye, appeared absolutely alike.

It might have been expected that this enlargement of the powers of the mind and of its store of natural knowledge could tend to nothing but the increase of a man's own welfare and the good of his fellow-men. But Zadig was fated to experience the vanity of such expectations.

"One day, walking near a little wood, he saw, hastening that way, one of the Queen's chief eunuchs, followed by a troop of officials, who appeared to be in the greatest anxiety, running hither and thither like men distraught, in search of some lost treasure.

"'Young man,' cried the eunuch, 'have you seen the Queen's dog?' Zadig answered modestly, 'A bitch, I think, not a dog.' 'Quite right,' replied the eunuch; and Zadig continued, 'A very small spaniel who has lately had puppies; she limps with the left foreleg, and has very long ears.' 'Ah! you have seen her then,' said the breathless eunuch. 'No,' answered Zadig, 'I have not seen her; and I really was not aware that the Queen possessed a spaniel.'

"By an odd coincidence, at the very same time, the handsomest horse in the King's stables broke away from his groom in the Babylonian plains. The grand huntsman and all his staff were seeking the horse with as much anxiety as the eunuch and his people the spaniel; and the grand huntsman asked Zadig if he had not seen the King's horse go that way.

"'A first-rate galloper, small-hoofed, five feet high; tail three feet and a half long; cheek pieces of the bit of twenty-three carat gold; shoes silver?' said Zadig.

"'Which way did he go? Where is he?' cried the grand huntsman.

"'I have not seen anything of the horse, and I never heard of him before,' replied Zadig.

"The grand huntsman and the chief eunuch made sure that Zadig had stolen both the King's horse and the Queen's spaniel, so they haled him before the High Court of Desterham, which at once condemned him to the knout, and transportation for life to Siberia. But the sentence was hardly pronounced when the lost horse and spaniel were found. So the judges were under the painful necessity of reconsidering their decision: but they fined Zadig four hundred ounces of gold for saying he had seen that which he had not seen.

"The first thing was to pay the fine; afterwards Zadig was permitted to open his defence to the court, which he did in the following terms:

"'Stars of justice, abysses of knowledge, mirrors of truth, whose gravity is as that of lead, whose inflexibility is as that of iron, who rival the diamond in clearness, and possess no little affinity with gold; since I am permitted to address your august assembly, I swear by Ormuzd that I have never seen the respectable lady dog of the Queen, nor beheld the sacrosanct horse of the King of Kings.

"'This is what happened. I was taking a walk towards the little wood near which I subsequently had the honour to meet the venerable chief eunuch and the most illustrious grand huntsman. I noticed the track of an animal in the sand, and it was easy to see that it was that of a small dog. Long faint streaks upon the little elevations of sand between the footmarks convinced me that it was a she dog with pendent dugs, showing that she must have had puppies not many days since. Other scrapings of the sand, which always lay close to the marks of the forepaws, indicated that she had very long ears; and, as the imprint of one foot was always fainter than those of the other three, I judged that the lady dog of our august Queen was, if I may venture to say so, a little lame.

"'With respect to the horse of the King of Kings, permit me to observe that, wandering through the paths which traverse the

wood, I noticed the marks of horse-shoes. They were all equidistant. "Ah!" said I, "this is a famous galloper." In a narrow alley, only seven feet wide, the dust upon the trunks of the trees was a little disturbed at three feet and a half from the middle of the path. "This horse," said I to myself, "had a tail three feet and a half long, and, lashing it from one side to the other, he has swept away the dust." Branches of the trees met overhead at the height of five feet, and under them I saw newly fallen leaves; so I knew that the horse had brushed some of the branches, and was therefore five feet high. As to his bit, it must have been made of twenty-three carat gold, for he had rubbed it against a stone, which turned out to be a touchstone, with the properties of which I am familiar by experiment. Lastly, by the marks which his shoes left upon pebbles of another kind, I was led to think that his shoes were of fine silver.'

"All the judges admired Zadig's profound and subtle discernment; and the fame of it reached even the King and the Queen. From the ante-rooms to the presence-chamber, Zadig's name was in everybody's mouth; and, although many of the magi were of opinion that he ought to be burnt as a sorcerer, the King commanded that the four hundred ounces of gold which he had been fined should be restored to him. So the officers of the court went in state with the four hundred ounces; only they retained three hundred and ninety-eight for legal expenses, and their servants expected fees."

Those who are interested in learning more of the fateful history of Zadig must turn to the original; we are dealing with him only as a philosopher, and this brief excerpt suffices for the exemplification of the nature of his conclusions and of the methods by which he arrived at them.

These conclusions may be said to be of the nature of retrospective prophecies; though it is perhaps a little hazardous to employ phraseology

which perilously suggests a contradiction in terms —the word "prophecy" being so constantly, in ordinary use, restricted to "foretelling." Strictly, however, the term prophecy applies as much to outspeaking as to foretelling; and, even in the restricted sense of "divination," it is obvious that the essence of the prophetic operation does not lie in its backward or forward relation to the course of time, but in the fact that it is the apprehension of that which lies out of the sphere of immediate knowledge; the seeing of that which, to the natural sense of the seer, is invisible.

The foreteller asserts that, at some future time, a properly situated observer will witness certain events; the clairvoyant declares that, at this present time, certain things are to be witnessed a thousand miles away; the retrospective prophet (would that there were such a word as "back-teller!") affirms that, so many hours or years ago, such and such things were to be seen. In all these cases, it is only the relation to time which alters—the process of divination beyond the limits of possible direct knowledge remains the same.

No doubt it was their instinctive recognition of the analogy between Zadig's results and those obtained by authorised inspiration which inspired the Babylonian magi with the desire to burn the philosopher. Zadig admitted that he had never either seen or heard of the horse of the king or of the spaniel of the queen; and yet he ventured to assert in

the most positive manner that animals answering to their description did actually exist and ran about the plains of Babylon. If his method was good for the divination of the course of events ten hours old, why should it not be good for those of ten years or ten centuries past; nay, might it not extend ten thousand years and justify the impious in meddling with the traditions of Oannes and the fish, and all the sacred foundations of Babylonian cosmogony?

But this was not the worst. There was another consideration which obviously dictated to the more thoughtful of the magi the property of burning Zadig out of hand. His defence was worse than his offence. It showed that his mode of divination was fraught with danger to magianism in general. Swollen with the pride of human reason, he had ignored the established canons of magian lore; and, trusting to what after all was mere carnal common sense, he professed to lead men to a deeper insight into nature than magian wisdom, with all its lofty antagonism to everything common, had ever reached. What, in fact, lay at the foundation of all Zadig's arguments but the coarse commonplace assumption, upon which every act of our daily lives is based, that we may conclude from an effect to the pre-existence of a cause competent to produce that effect?

The tracks were exactly like those which dogs and horses leave; therefore they were the effects

of such animals as causes. The marks at the sides of the fore-prints of the dog track were exactly such as would be produced by long trailing ears; therefore the dog's long ears were the causes of these marks—and so on. Nothing can be more hopelessly vulgar, more unlike the majestic development of a system of grandly unintelligible conclusions from sublimely inconceivable premisses such as delights the magian heart. In fact, Zadig's method was nothing but the method of all mankind. Retrospective prophecies, far more astonishing for their minute accuracy than those of Zadig, are familiar to those who have watched the daily life of nomadic people.

From freshly broken twigs, crushed leaves, disturbed pebbles, and imprints hardly discernible by the untrained eye, such graduates in the University of Nature will divine, not only the fact that a party has passed that way, but its strength, its composition, the course it took, and the number of hours or days which have elapsed since it passed. But they are able to do this because, like Zadig, they perceive endless minute differences where untrained eyes discern nothing; and because the unconscious logic of common sense compels them to account for these effects by the causes which they know to be competent to produce them.

And such mere methodised savagery was to discover the hidden things of nature better than *a priori* deductions from the nature of Ormuzd—

perhaps to give a history of the past, in which Oannes would be altogether ignored! Decidedly it were better to burn this man at once.

If instinct, or an unwonted use of reason, led Moabdar's magi to this conclusion two or three thousand years ago, all that can be said is that subsequent history has fully justified them. For the rigorous application of Zadig's logic to the results of accurate and long-continued observation has founded all those sciences which have been termed historical or palætiological, because they are retrospectively prophetic and strive towards the reconstruction in human imagination of events which have vanished and ceased to be.

History, in the ordinary acceptation of the word, is based upon the interpretation of documentary evidence; and documents would have no evidential value unless historians were justified in their assumption that they have come into existence by the operation of causes similar to those of which documents are, in our present experience, the effects. If a written history can be produced otherwise than by human agency, or if the man who wrote a given document was actuated by other than ordinary human motives, such documents are of no more evidential value than so many arabesques.

Archæology, which takes up the thread of history beyond the point at which documentary evidence fails us, could have no existence, except

for our well grounded confidence that monuments and works of art or artifice, have never been produced by causes different in kind from those to which they now owe their origin. And geology, which traces back the course of history beyond the limits of archæology, could tell us nothing except for the assumption that, millions of years ago, water, heat, gravitation, friction, animal and vegetable life, caused effects of the same kind as they now cause. Nay, even physical astronomy, is so far as it takes us back to the uttermost point of time which palætiological science can reach, is founded upon the same assumption. If the law of gravitation ever failed to be true, even to a small extent, for that period, the calculations of the astronomer have no application.

The power of prediction, of prospective prophecy, is that which is commonly regarded as the great prerogative of physical science. And truly it is a wonderful fact that one can go into a shop and buy for a small price a book, the "Nautical Almanac," which will foretell the exact position to be occupied by one of Jupiter's moons six months hence; nay, more, that, if it were worth while, the Astronomer-Royal could furnish us with as infallible a prediction applicable to 1980 or 2980.

But astronomy is not less remarkable for its power of retrospective prophecy.

Thales, oldest of Greek philosophers, the dates

of whose birth and death are uncertain, but who flourished about 600 B.C., is said to have foretold an eclipse of the sun which took place in his time during a battle between the Medes and the Lydians. Sir George Airy has written a very learned and interesting memoir[1] in which he proves that such an eclipse was visible in Lydia on the afternoon of the 28th of May in the year 585 B.C.

No one doubts that, on the day and at the hour mentioned by the Astronomer-Royal, the people of Lydia saw the face of the sun totally obscured. But, though we implicitly believe this retrospective prophecy, it is incapable of verification. In the total absence of historical records, it is impossible even to conceive any means of ascertaining directly whether the eclipse of Thales happened or not. All that can be said is, that the prospective prophecies of the astronomer are always verified; and that, inasmuch as his retrospective prophecies are the result of following backwards, the very same method as that which invariably leads to verified results, when it is worked forwards, there is as much reason for placing full confidence in the one as in the other. Retrospective prophecy is therefore a legitimate function of astronomical science; and if it is legitimate for one science it is legitimate for

[1] "On the Eclipses of Agathocles, Thales, and Xerxes," *Philosophical Transactions*, vol. cxliii.

all; the fundamental axiom on which it rests, the constancy of the order of nature, being the common foundation of all scientific thought. Indeed, if there can be grades in legitimacy, certain branches of science have the advantage over astronomy, in so far as their retrospective prophecies are not only susceptible of verification, but are sometimes strikingly verified.

Such a science exists in that application of the principles of biology to the interpretation of the animal and vegetable remains imbedded in the rocks which compose the surface of the globe, which is called Palæontology.

At no very distant time, the question whether these so-called "fossils," were really the remains of animals and plants was hotly disputed. Very learned persons maintained that they were nothing of the kind, but a sort of concretion, or crystallisation, which had taken place within the stone in which they are found; and which simulated the forms of animal and vegetable life, just as frost on a window-pane imitates vegetation. At the present day, it would probably be impossible to find any sane advocate of this opinion; and the fact is rather surprising, that among the people from whom the circle-squarers, perpetual-motioners, flat-earth men and the like, are recruited, to say nothing of table-turners and spirit-rappers, somebody has not perceived the easy avenue to nonsensical notoriety open to any

one who will take up the good old doctrine, that fossils are all *lusus naturæ*.

The position would be impregnable, inasmuch as it is quite impossible to prove the contrary. If a man choose to maintain that a fossil oyster shell, in spite of its correspondence, down to every minutest particular, with that of an oyster fresh taken out of the sea, was never tenanted by a living oyster, but is a mineral concretion, there is no demonstrating his error. All that can be done is to show him that, by a parity of reasoning, he is bound to admit that a heap of oyster shells outside a fishmonger's door may also be "sports of nature," and that a mutton bone in a dust-bin may have had the like origin. And when you cannot prove that people are wrong, but only that they are absurd, the best course is to let them alone.

The whole fabric of palæontology, in fact, falls to the ground unless we admit the validity of Zadig's great principle, that like effects imply like causes, and that the process of reasoning from a shell, or a tooth, or a bone, to the nature of the animal to which it belonged, rests absolutely on the assumption that the likeness of this shell, or tooth, or bone, to that of some animal with which we are already acquainted, is such that we are justified in inferring a corresponding degree of likeness in the rest of the two organisms. It is on this very simple principle, and not upon imaginary

laws of physiological correlation, about which, in most cases, we know nothing whatever, that the so-called restorations of the palæontologist are based.

Abundant illustrations of this truth will occur to every one who is familiar with palæontology; none is more suitable than the case of the so-called *Belemnites*. In the early days of the study of fossils, this name was given to certain elongated stony bodies, ending at one extremity in a conical point, and truncated at the other, which were commonly reputed to be thunderbolts, and as such to have descended from the sky. They are common enough in some parts of England; and, in the condition in which they are ordinarily found, it might be difficult to give satisfactory reasons for denying them to be merely mineral bodies.

They appear, in fact, to consist of nothing but concentric layers of carbonate of lime, disposed in subcrystalline fibres, or prisms, perpendicular to the layers. Among a great number of specimens of these Belemnites, however, it was soon observed that some showed a conical cavity at the blunt end; and, in still better preserved specimens, this cavity appeared to be divided into chambers by delicate saucer-shaped partitions, situated at regular intervals one above the other. Now there is no mineral body which presents any structure comparable to this, and the conclusion suggested itself that the Belemnites must be the effects of

causes other than those which are at work in inorganic nature. On close examination, the saucer-shaped partitions were proved to be all perforated at one point, and the perforations being situated exactly in the same line, the chambers were seen to be traversed by a canal, or *siphuncle*, which thus connected the smallest or aphical chamber with the largest. There is nothing like this in the vegetable world; but an exactly corresponding structure is met with in the shells of two kinds of existing animals, the pearly *Nautilus* and the *Spirula*, and only in them. These animals belong to the same division—the *Cephalopoda*—as the cuttle-fish, the squid, and the octopus. But they are the only existing members of the group which possess chambered, siphunculated shells; and it is utterly impossible to trace any physiological connection between the very peculiar structural characters of a cephalopod and the presence of a chambered shell. In fact, the squid has, instead of any such shell, a horny "pen," the cuttle-fish has the so-called "cuttle-bone," and the octopus has no shell, or, at most, a mere rudiment of one.

Nevertheless, seeing that there is nothing in nature at all like the chambered shell of the Belemnite, except the shells of the *Nautilus* and of the *Spirula*, it was legitimate to prophesy that the animal from which the fossil proceeded must have belonged to the group of the *Cephalopoda*.

Nautilus and *Spirula* are both very rare animals, but the progress of investigation brought to light the singular fact, that, though each has the characteristic cephalopodous organisation, it is very different from the other. The shell of *Nautilus* is external, that of *Spirula* internal; *Nautilus* has four gills, *Spirula* two; *Nautilus* has multitudinous tentacles, *Spirula* has only ten arms beset with horny-rimmed suckers; *Spirula*, like the squids and cuttlefishes, which it closely resembles, has a bag of ink which it squirts out to cover its retreat when alarmed; *Nautilus* has none.

No amount of physiological reasoning could enable any one to say whether the animal which fabricated the Belemnite was more like *Nautilus*, or more like *Spirula*. But the accidental discovery of Belemnites in due connection with black elongated masses which were certainly fossilised ink-bags, inasmuch as the ink could be ground up and used for painting as well as if it were recent sepia, settled the question; and it became perfectly safe to prophesy that the creature which fabricated the Belemnite was a two-gilled cephalopod with suckers on its arms, and with all the other essential features of our living squids, cuttlefishes, and *Spirulæ*. The palæontologist was, by this time, able to speak as confidently about the animal of the Belemnite, as Zadig was respecting the queen's spaniel. He could give a very fair description of its external appearance, and even enter pretty

fully into the details of its internal organisation, and yet could declare that neither he, nor any one else, had ever seen one. And as the queen's spaniel was found, so happily has the animal of the Belemnite; a few exceptionally preserved specimens having been discovered, which completely verify the retrospective prophecy of those who interpreted the facts of the case by due application of the method of Zadig.

These Belemnites flourished in prodigious abundance in the seas of the mesozoic, or secondary, age of the world's geological history; but no trace of them has been found in any of the tertiary deposits, and they appear to have died out towards the close of the mesozoic epoch. The method of Zadig, therefore, applies in full force to the events of a period which is immeasurably remote, which long preceded the origin of the most conspicuous mountain masses of the present world, and the deposition, at the bottom of the ocean, of the rocks which form the greater part of the soil of our present continents. The Euphrates itself, at the mouth of which Oannes landed, is a thing of yesterday compared with a Belemnite; and even the liberal chronology of magian cosmogony fixes the beginning of the world only at a time when other applications of Zadig's method afford convincing evidence that, could we have been there to see, things would have looked very much as they do now. Truly the magi were wise

in their generation; they foresaw rightly that this pestilent application of the principles of common sense, inaugurated by Zadig, would be their ruin.

But it may be said that the method of Zadig, which is simple reasoning from analogy, does not account for the most striking feats of modern palæontology—the reconstruction of entire animals from a tooth or perhaps a fragment of a bone; and it may be justly urged that Cuvier, the great master of this kind of investigation, gave a very different account of the process which yielded such remarkable results.

Cuvier is not the first man of ability who has failed to make his own mental processes clear to himself, and he will not be the last. The matter can be easily tested. Search the eight volumes of the "Recherches sur les Ossemens Fossiles" from cover to cover, and nothing but the application of the method of Zadig will be found in the arguments by which a fragment of a skeleton is made to reveal the characters of the animal to which it belonged.

There is one well-known case which may represent all. It is an excellent illustration of Cuvier's sagacity, and he evidently takes some pride in telling his story about it. A split slab of stone arrived from the quarries of Montmartre, the two halves of which contained the greater part of the skeleton of a small animal. On careful examina-

tions of the characters of the teeth and of the lower jaw, which happened to be exposed, Cuvier assured himself that they presented such a very close resemblance to the corresponding parts in the living opossums that he at once assigned the fossil to that genus.

Now the opossums are unlike most mammals in that they possess two bones attached to the fore part of the pelvis, which are commonly called "marsupial bones." The name is a misnomer, originally conferred because it was thought that these bones have something to do with the support of the pouch, or marsupium, with which some, but not all, of the opossums are provided. As a matter of fact, they have nothing to do with the support of the pouch, and they exist as much in those opossums which have no pouches as in those which possess them. In truth, no one knows what the use of these bones may be, nor has any valid theory of their physiological import yet been suggested. And if we have no knowledge of the physiological importance of the bones themselves, it is obviously absurd to pretend that we are able to give physiological reasons why the presence of these bones is associated with certain peculiarities of the teeth and of the jaws. If any one knows why four molar teeth and an inflected angle of the jaw are very generally found along with marsupial bones, he has not yet communicated that knowledge to the world.

If, however, Zadig was right in concluding from the likeness of the hoof-prints which he observed to a horse's that the creature which made them had a tail like that of a horse, Cuvier, seeing that the teeth and jaw of his fossil were just like those of an opossum, had the same right to conclude that the pelvis would also be like an opossum's; and so strong was his conviction that this retrospective prophecy, about an animal which he had never seen before, and which had been dead and buried for millions of years, would be verified, that he went to work upon the slab which contained the pelvis in confident expectation of finding and laying bare the "marsupial bones," to the satisfaction of some persons whom he had invited to witness their disinterment. As he says:—"Cette opération se fit en présence de quelques personnes à qui j'en avais annoncé d'avance le résultat, dans l'intention de leur prouver par le fait la justice de nos théories zoologiques; puisque le vrai cachet d'une théorie est sans contredit la faculté qu'elle donne de prévoir les phénomènes."

In the "Ossemens Fossiles" Cuvier leaves his paper just as it first appeared in the "Annales du Muséum," as "a curious monument of the force of zoological laws and of the use which may be made of them."

Zoological laws truly, but not physiological laws. If one sees a live dog's head, it is extremely probable that a dog's tail is not far off, though nobody

can say why that sort of head and that sort of tail go together; what physiological connection there is between the two. So, in the case of the Montmartre fossil, Cuvier, finding a thorough opossum's head, concluded that the pelvis also would be like an opossum's. But, most assuredly, the most advanced physiologist of the present day could throw no light on the question why these are associated, nor could pretend to affirm that the existence of the one is necessarily connected with that of the other. In fact, had it so happened that the pelvis of the fossil had been originally exposed, while the head lay hidden, the presence of the "marsupial bones," though very like an opossum's, would by no means have warranted the prediction that the skull would turn out to be that of the opossum. It might just as well have been like that of some other marsupial; or even like that of the totally different group of Monotremes, of which the only living representatives are the *Echidna* and the *Ornithorhynchus*.

For all practical purposes, however, the empirical laws of co-ordination of structures, which are embodied in the generalisations of morphology, may be confidently trusted, if employed with due caution, to lead to a just interpretation of fossil remains; or, in other words, we may look for the verification of the retrospective prophecies which are based upon them.

And if this be the case, the late advances which have been made in palæontological discovery open out a new field for such prophecies. For it has been ascertained with respect to many groups of animals, that, as we trace them back in time, their ancestors gradually cease to exhibit those special modifications which at present characterise the type, and more nearly embody the general plan of the group to which they belong.

Thus, in the well-known case of the horse, the toes which are suppressed in the living horse are found to be more and more complete in the older members of the group, until, at the bottom of the Tertiary series of America, we find an equine animal which has four toes in front and three behind. No remains of the horse tribe are at present known from any Mesozoic deposit. Yet who can doubt that, whenever a sufficiently extensive series of lacustrine and fluviatile beds of that age becomes known, the lineage which has been traced thus far will be continued by equine quadrupeds with an increasing number of digits, until the horse type merges in the five-toed form towards which these gradations point?

But the argument which holds good for the horse, holds good, not only for all mammals, but for the whole animal world. And as the study of the pedigrees, or lines of evolution, to which, at present, we have access, brings to light, as it assuredly will do, the laws of that process, we

shall be able to reason from the facts with which the geological record furnishes us to those which have hitherto remained, and many of which, perhaps, may for ever remain, hidden. The same method of reasoning which enables us, when furnished with a fragment of an extinct animal, to prophesy the character which the whole organism exhibited, will, sooner or later, enable us, when we know a few of the later terms of a genealogical series, to predict the nature of the earlier terms.

In no very distant future, the method of Zadig, applied to a greater body of facts than the present generation is fortunate enough to handle, will enable the biologist to reconstruct the scheme of life from its beginning, and to speak as confidently of the character of long extinct living beings, no trace of which has been preserved, as Zadig did of the queen's spaniel and the king's horse. Let us hope that they may be better rewarded for their toil and their sagacity than was the Babylonian philosopher; for perhaps, by that time, the magi also may be reckoned among the members of a forgotten Fauna, extinguished in the struggle for existence against their great rival, common sense.