True and False Interpretations of Nature.

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TRUE AND FALSE INTERPRETATIONS OF NATURE.

When one engages in any work, whether mental or physical, it is of the greatest importance that he consider carefully what he proposes to do. This is especially true when one enters upon professional study. Failure or success are not so much dependent upon diligence and application as upon right conceptions. I mean, of course, the highest kind of success—that which each of you hopes for. I know that this is not the statement you generally hear. You have been constantly told since the time you first went to school that hard work in your studies will give you the mastery over them, but I now tell you that such is not always the case. I have seen example after example of diligent, faithful, hard-working students, who got just so far and stopped. They never accomplished what they set out to. They were failures at the beginning and remained failures at the end. I do not mean to say that such failures are as bad as those caused by idleness and dissipation, but they are none the less failures.

I have come to believe that in a great many of such cases the failure lies in just this lack of proper conceptions of the studies they are engaged in, about which I shall speak to you. And I am very sure that I shall do some of you no small service if I can cause you to ask yourselves in great seriousness whether you are beginning or proceeding in the studies you have undertaken with true or false methods of thought. Now I do not propose to do this entirely by telling you just how to form proper conceptions. Such didactic teaching would have a certain value, but not nearly as much as to present to you, from the history of the science I shall

instruct you in, the remarkable and far-reaching effects of wrong ideas.

During the so-called dark or middle ages, from perhaps 400 to 1600 A.D., there was a class of men in the various countries of Europe known as alchemists. Some of them had the additional title of adepts. The special claim made for them and by them was a knowledge of nature's laws and secret processes beyond that of ordinary minds. The adepts, indeed, claimed that they had arrived at ultimate knowledge of nature—not only knew just how the most precious as well as the most common things were made, but could make them. The common alchemists had not progressed so far in knowledge but were on the road to it, and ultimately expected to reach that goal. We associate with them the idea of the philosopher's stone, by which gold could be produced at will, but really that was only a part of their search. Of course, when a man knew all of nature's secrets, the one he would naturally use most would be the power of supplying himself with all the gold he wanted, and so in the common mind the alchemists and adepts were simply gold-makers.

It is that aspect of them which is commonly presented to-day. Those who acquire great fortunes suddenly are said, like the alchemists of old, to have possession of the philosopher's stone or the golden touch. I shall have nothing to do with such comparisons in this lecture, for, in the first place, they are hardly justifiable, for as a matter of fact the alchemists were as a rule miserably poor. They either did not possess the power they claimed or possessed a self-control beyond belief. In the second place there seems to me to be very little suggestive of gold-making about the study or practice of medicine. Neither do I propose to dwell chiefly upon the fraudulent side of alchemy. There is no need of going back to the middle ages to obtain texts for that kind of preaching.

They were, it is true, monumental frauds, claiming as all frauds do, powers which they did not possess, but they were also the representative scientific men of their times, and as

honest as their philosophy would let them. Their fraudulent practices were natural outgrowths of their mental attitude towards nature, and my purpose is to dwell chiefly upon that.

The alchemist regarded nature as exceeding simple. The apparent complexity of it was due to the observer rather than anything in nature. Like a knit garment which seems very complex to ordinary examination, it could easily be unraveled if one only found the end of the yarn. As material things were to them largely if not wholly subjective instead of objective—that is, were mental concepts instead of actual things—the end of the yarn would not be found by carefully examining the garment, but by thinking it out.

They saw no absurdity in the notion that immaterial principles make material substances. Salt, sulphur, and mercury were the three primal or elementary substances, to which many added a fourth, "the soul matter," which never materialized but was the animating principle of all matter. These three primal substances were to them not elements, as we think of elements, but principles rather. The salt represented the principle of solubility and crystallization, the sulphur the principle of inflammability, and the mercury the metallic and volatile principle. According to their views the properties of substances by which we recognize them were not due to the materials in them, but to certain principles. In sugar there was a preponderance of the principle of sweetness, and in vinegar the principle of sourness, and so on. Anything could be made sweet or sour by adding to it the principle of sweetness or sourness. The simplicity of nature and the immateriality of material things were the fundamental concepts of alchemy. It would be of interest, if there were time, to trace the growth of these ideas, and see how they came to be so fixed in the minds of thinking men that they could remain there for so many hundreds of years. They were, briefly, the products of the interpretation of the writings of Plato and Aristotle, by the mystic philosophy which began with the so-called Neo-Platonism of the third century. This

claimed that the only knowledge worth having is that which comes from within. By shutting out from the mind all external knowledge one could, according to Plotinus of Alexandria, one of its first exponents, come into oneness with and knowledge of the divine essence.

One way of bringing about this shutting out of all externals was by standing quietly and fixing the eyes on the end of one's nose, which would induce a kind of trance or ecstasy, during which this union took place. Plotinus and his immediate followers refused to speak of what they saw during their trances. It was, they said, unutterable, and moreover did not concern others. They claimed also that they had no words with which to describe it, which was probably true. This naturally became a very popular philosophy. It was impressive and easy. It put a premium upon mental vacuity. The highest type of mind was one which could remain longest in the general condition of an X-ray bulb, completely pumped out. It was not to be expected that such a philosophy would remain long in that condition. It was too good an opportunity to be lost. Knowledge thus divinely given must be imparted, or perhaps into minds thus empty the devils more naturally came, as in the case spoken of in the Bible. At any rate revelations of what was claimed to be the divine order of the universe began to be made. In these, material things were always shown to be unimportant, a simple clothing of divinity for temporary purposes only, perfectly easy to be understood, but hardly worth the trouble of investigation. A philosophy like this, so universally believed in, could not fail to influence human thought into whatsoever channel it was turned, and it did so influence it.

Material things might be philosophically unimportant, but actually they were seen to be very important, especially to human comfort. If they were so simple of comprehension, then why not understand them and use them more intelligently? It was of course "dirty work," this study of material things, but there was apparently "money in it," and that was enough.

And so alchemy arose, and this is the way the principles we associate with alchemy came to be believed in. We see that the possibility of the transmutation of metals was a natural result of the philosophy of the time. Gold, the most precious of metals, was also the most perfect thing in nature. All nature was moving towards perfection, and just as but a few human beings had yet attained it, so in material things there was but a small amount of gold. As man could suddenly reach perfection by accepting and practicing certain principles, so material things might be changed suddenly to gold by adding to them the principle of perfection in nature. To some the principle of perfection was the same for all nature, and a perfect man could, on account of his perfection, bring about perfection in material things as he chose, but the more general belief came to be that the principles were different and must be separately sought, though the possession of one made it easier to get the other. Hence in the writings of the alchemists a great deal is made of internal purification as essential to the discovery of the philosopher's stone.

The prevailing philosophy of mysticism was responsible also for the connection of devils with the alchemists. Certain visions had made it clear that God did not directly rule in the world, but that there were orders of beings, called variously angels, powers, souls, etc., each order of which had its separate duty. The lowest of all, the dæmons, controlled material things, and power over these came only through propitiation of them. At first there was nothing out of the way in such propitiation, but later, as the dæmons became more consolidated into the devil, the alchemist was believed to obtain his power over nature only by an unholy compact with Satan. I must admit that there is something very attractive in some aspects of that old philosophy, and possibly that accounts for its survival to the extent it does. It was, as all complete knowledge is, satisfying and restful. We all long for rest, both physical and mental. There is great comfort to us in a definition which we believe to be comprehensive

and final. We hate to give it up and only do so after a struggle. One of the beauties of the multiplication table is that it remains through life as absolute knowledge. We can rest upon it, can look over and above it and all round it, and see nothing else to know about it.

This mystic philosophy was the same to its believers. It magnified man by belittling the things around him. The fact that it belittled God also did not seem to trouble anybody. Indeed they did not hesitate to say that through it man became one with God, and was actually at times God himself. We appreciate this idea of rest the more as we grow older, especially as teachers. We would like to arrive at something more definite and certain. We would like at least to be able to use the lectures of one year for the next; we are impatient of every new discovery which makes us revise our notes, and would like to join some Rosicrucian or Philadelphian society, and by taking all its degrees come to absolute knowledge. It is hard for us to believe that there is no such possibility. It is easy for us to think that on some other road it may be easier traveling and a shorter distance to the goal.

It is no part of my purpose to describe minutely the alchemical methods of experimentation, in so far as they did experiment. As I have several times said, it is their attitude of mind which I particularly want to bring out. We know that a part of their search was for the elixir of life or universal solvent. This was usually identified with the philosopher's stone. All imperfection was disease, whether in man or matter. The perfect was the well, hence cure the diseases of matter and it would be the highest form of matter, or gold. "Bring me the seven lepers that I may heal them," exclaimed the alchemist Geber, referring to the seven base metals.

The alchemical period is usually regarded as closing with the sixteenth century, because by that time experimentation had led to important modification of ideas about nature, especially its simplicity. Thus for at least twelve hundred

years those wrong ideas operated to prevent the increase of real knowledge of nature.

But even as late as 1575 one Jacob Behmen, a shoemaker of Goelitz, claimed to have had the whole constitution and mystery of nature revealed to him in a few visions, and the books describing it exerted a wide influence. Like the other mystics he claimed that he could not adequately describe what he saw, but he tried to in a number of ponderous volumes. As one reads his works he makes it appear that he is just going to give the magic key into your hands which will unlock all nature's mysteries, but he never quite does. It is like the wreath of the fair Astrid, which always fell to pieces just as she was about to complete it. Like some of us he wished to give the impression of knowing more than he actually did.

As I have intimated, the first staggering blow which alchemy received was the perception of the fact that nature is not so simple after all. Here, at last, was a right idea, and though it was but dimly perceived, it was held to and expanded and immediately began to bear fruit. It is important to notice that this idea did not appear as the result of a great increase of knowledge about nature. Right ideas rarely come from the piling up of facts alone. For hundreds of years they had had facts enough to have seen the proper interpretation. A certain number of facts are always necessary to form right ideas, but a right use of what we have is always of more importance than a great increase in their number. It is always a source of mystery to some who have spent years in taking long courses of education, to see those whose educational advantages have been much less, easily surpass them in a given profession. They accuse them, mentally at least, of tricks, and of course, such apparent success is very frequently the result of fraud. But frequently also it is the legitimate result of that most important power of seeing things in their right relations.

This new idea was of especial importance as the beginning

of a belief in the honesty of nature. Hitherto she had been regarded as totally dishonest and untrustworthy, as constantly trying to deceive men by false appearances. Her phenomena did not mean what they seemed to, but must always be interpreted. This of course led to personal dishonesty, as such associations always do. If nature deceived, her votaries might. If she said what she did not mean, they not only could but ought to.

Hence not only the speech but the writings of the alchemists were obscured as much as possible, and they unblushingly claimed to be able to do what they knew they could not. Many of their written records, for this reason, are absolutely unintelligible, but that is no great loss except to the curious historian. As an example of this hear how an alchemist (Bernard of Treviso) describes the well-known simple solution of gold in mercury, by which upon evaporation black metallic gold powder results: "The king when he comes to the fountain, leaving all strangers behind him, enters the bath alone, clothed in golden robes, which he puts off and gives to Saturn, his first chamberlain, from whom he receiveth a black velvet suit."

The fundamental idea which all students of nature must get for any kind of success is absolute trust in nature. Lack of this leads to dishonesty now as it did in the middle ages. The real clue to the labyrinth, the end of yarn, had now been found. The first fruit of the idea was an increase in the number of the elements. Whatever could not be proved to be compound by actual experiment they began to regard as elementary, just as we do now.

Of course they did not at once begin to deny the great principle of philosophy which declared that there could be but four elements at most, but they could say they were unable to verify it. The complexity of nature and reality of natural phenomena were still further substantiated by the work of Copernicus and Galileo, and before the seventeenth

century closed the material part of nature as a legitimate field of study had been fully recognized.

Theories of the constitution of matter, based upon experiments, now began to appear. These were of course crude. It was hard to shake off at once the old manner of reasoning. We smile at some of them now, but the fact that they have been disproved hardly detracts from their value, when they were properly formed. It was too much to expect that the old ideas should be discarded at once.

It was harder, apparently, to get right views of the materiality of matter than of the complexity of nature. The line dividing matter from force was not clearly seen, and those early theories confused the two. One of the most famous of these theories was that which attempted to explain the process of burning. It was called the phlogiston theory. It affirmed that burning was the passage of a heat substance from the burning body to things around. This heat substance was called phlogiston. This theory was advanced by one John Beccher, in the latter part of the sixteenth century, and was the product of right ideas, in that it seemed to explain reasonably both well-known facts and special experiments which he made. His reasoning was admirable for the time. Fire does, even to us, seem to be a substance, and its phenomena can very well be explained by the passage of this from one substance to another. But the test of a theory is its applicability to other than common phenomena, and Beccher's seemed to stand that test also. What could be more convincing than this? Metals heated in the air change with more or less rapidity to powdery substances called rusts. They actually burn in doing this, but their rusts will not burn. If, however, these rusts be mixed with charcoal, and the mixture set on fire, the charcoal almost entirely burns up, and at the same time the metallic rust changes back to the original metal. What more natural explanation than that the fire, of which the charcoal was, of course, largely composed, had combined again with the rust to form the metal. Metals must then be looked upon as compounds of their rusts with fire.

The weak point of this theory, that the rusts were actually heavier than the metals from which they came, was not at first noticed, and when noticed not considered as invalidating the theory, for the idea that all matter must have weight had not as yet been clearly perceived. It took nearly two hundred years for this fundamental error to be eliminated, but it was finally done by that great French chemist, Lavoisier, at the very last part of the eighteenth century, but the discovery of oxygen was necessary to do it. Here again, after the introduction of right ideas about material, even in such a marked manner, progress was rather slow. Heat, light, electricity, and other forces might not be materials in the ordinary meaning of the term, but they were still regarded as kinds of substances, and were for a long time classed by themselves as the imponderables. Of course we now know that they are no more substances than the spin of a top or the motion of a wheel is a substance. And still the motorman speaks of losing "the juice" when his current fails him, and men who ought to know better talk of energy and force as though they were entities, and form theories affecting the most important relations of life with ideas of such things as incorrect as those of the alchemists.

It has taken longer than I thought it would to sketch the history of wrong ideas as illustrated by alchemy—so long that there is danger that the illustration may have been weakened, but I hope not, for when properly considered, can anything be more instructive than the absolute stagnation of science for more than one thousand years as a direct result of wrong fundamental conceptions?

But the bringing forward of the results of wrong ideas has a greater effect if it can be contrasted with the action of right, and fortunately this same science of chemistry can furnish many illustrations to serve such a purpose. One of the most striking of these is seen in the proposal and development of the atomic theory. It was not evolved, in the first instance, from the inner consciousness of John Dalton,

but was offered by him to account for carefully conducted experiments — experiments made, too, for the purpose of finding out something more about the constitution of matter than the French school of chemists, under Lavoisier, had found out in their admirable series of experiments, by which the true chemical character of combustion had been determined. Dalton probably thought no harder or more accurately about his experiments than the old alchemists did about theirs, for it is a mistake to think that they were not close reasoners. They could follow as accurately from premise to conclusion when once an argument was started as the best logicians of any age. But they started with wrong ideas and Dalton with right, and his theories were progressive and theirs stagnant. The atomic theory has been developed into so complex a thing that if Dalton were alive now he would not recognize the child of his own brain, but it has been developed by the same kind of ideas with which he started it, and consequently has been a wonderful aid to chemical progress. Even if it had been entirely disproved and abandoned years ago it would not affect the principle I am trying to bring out, for it corresponded to the facts then known, and hence was a right idea. The theories of the alchemists were wrong because they did not correspond to their own observations.

Their theories of the simplicity of nature made them afraid of new ideas, especially those which went in any measure against this conception. By contemplation and absorption and mental evacuation they got their minds so empty that a few new ideas, if they got in, rattled round like peas in a dried bladder and made so much noise that they were frightened by them. Their conception of God, like that of some modern theologians, was that he was a simple-minded being, who could not have made a complex world. They felt it their duty to guard him as friends do some member of their family whose intellect is feeble.

Of course it is a fair question to ask whether they could

have had different ideas from what they had. But it is not a question which need concern us much now. It is enough for us to see the result of not having them. It is also undoubtedly true that there is no excuse for our not having them. All the best philosophical and religious thought of the time is favorable to our having them. So far from hindering us, every authority aids. We are born into a glorious inheritance of free thought, and shall we not take the fullest possible advantage of it? The only thing which will prevent our doing so is our own mental inertia. It is undeniably harder to get started right than wrong. The complexity of nature is hard to grasp, and the difficulty increases the farther we go. It seems as though every door we open into her mysteries but reveals two others more securely fastened.

Illustrations of this are on every hand. Take for example the atomic theory. From the simple atoms of Dalton, with their simple attractions for each other, we have gone to the complex conceptions of Lord Kelvin and Clerk Maxwell—conceptions of vortex motions in a frictionless medium; whirling rings of something, we know not what, of such small size that millions of them can dance upon the point of the smallest needle with no danger of any falling off. A cubic inch of air must contain at least one thousand million million million of them, each vibrating four hundred million million times a second, and having forward movements more rapid than the earth in its orbit. Beyond them we recognize the medium in which they move, and are trying to comprehend it also in some measure. In the same manner the field has broadened as we have investigated each one of the forces—heat, light, electricity, etc. Take the cases in medical science. The simple theories first propounded by Pasteur have developed into the complex science of bacteriology, and beyond the bacteria we are now investigating the ptomaines and leucomaines, the toxines and antitoxines.

Sir Joseph Lister, some years ago, brought forward the

principle of antiseptic surgery, and now the preparation and use of disinfectants is almost a separate science.

The very thought of all this complexity is at first discouraging, but it need not be. It is not necessary to professional success to know it all, but it is necessary to have right conceptions of it and to use the practical principles derived from it. But, because of this complexity, the old ideas are more easily grasped and are constantly reappearing. It is so much easier to evolve a simple theory of nature from one's inner consciousness that many prefer to do it. We can well call such the alchemists of the present day. We see them in all walks of life, offering to us their elixirs of life or philosopher's stones for the perfect cure and renovation of society, for they are not only alchemists, but adepts. They are especially numerous in political life. Just what should be done to meet all exigencies is perfectly clear to them. They have been lifted up above all the clouds which obscure. The careful and conscientious student of politics knows nothing compared to them. Of course, like the alchemists of old, they do not claim that they got this knowledge by selling themselves to the devil; but we almost wish they had and that the contract would run out speedily.

The theological alchemist is also much in evidence. Alchemy from the first was closely linked with theology, but true theology, like chemistry, long ago came out from its influence, and any attempts to revive its spirit there can only have local and temporary success. True religion is a carefully-conducted life in all its complex details, and no simple cabalistic formula can be a substitute for it.

But the spirit of alchemy in education is perhaps more to be dreaded by us than its other manifestations, especially in medical education. Alchemy was closer to medicine than to any other science, and it has been harder to get rid of there. Long after it was deemed impossible to understand material nature by simply thinking about it, and getting some vision to help unravel its mysteries, it was thought perfectly possible

to understand the laws of the human body by just such a process. Systematic study, such as alone gave knowledge in other departments, was not thought necessary here; and even now many otherwise level-headed people think the same thing. You cannot have lived in any community without having seen more or less of such a spirit, and possibly have been influenced by it. If the fact could be clearly brought to the attention of certain men and women who rush enthusiastically after such teachers, that their doctrines, instead of being new, are old; that they represent straw thoroughly threshed and trodden under the foot of man hundreds of years ago, they might possibly look upon them differently.

What the explanation is of this revival of mediæval mysticism is uncertain. Perhaps it is a natural reaction from too much attention to the physical side of nature. A prominent writer, Charles Dudley Warner, in a recent magazine article, takes this view of it. He says: "If the physical life is more abounding and more cared for, if there is more enlightenment in a way, there is a certain disorganization and flying from a center. Religions and sects and facts have multiplied, and there is a revival of superstitions and occultisms already deemed outworn in the middle ages. Society becomes not only emancipated but tangential. Spiritualism, theosophy, mind-reading, telepathy, mind-cure, Christian science, thought-transfer, astrology, and all the whims of a stimulated body and unanchored mind flourish in the very center where the Puritan fried his meat and his doughnuts and believed in God."

I do not believe, and he probably does not, that such mental disorganization is a necessary part of abounding physical life, or that dyspepsia naturally accompanies sound thought and true religion. But, as I have said before, I think these things are attractive chiefly because they offer easy solutions of difficult problems, and that is unquestionably the demand of the times. Schemes and methods which will educate a child automatically and without work on his or the

teacher's part are being exploited. Money-making without care and thrift is wanted. I think, also, that we naturally magnify the possibilities of things we do not understand, especially if we study them superficially. So, many men read up a little on science and loudly claim that a great deal more is known about nature than actually is, and others cram up upon theological matters, and overestimate just as much the real knowledge of them possessed by real theologians.

I need not tell you that those who conduct this school for medical instruction have no sympathy with such ideas. They believe that all nature is complex, and that the most complex thing in it is the human body, and hence to understand as much as one can of its organs in health and disease requires the highest qualities of mind and the most persistent application. They are not believers in any elixir of life or philosopher's stone, which can be obtained by contemplation or intuition. They do not believe that there is any one simple formula which is applicable to all cases of disease. They don't intend to give pass tickets or diplomas to any whose heads resemble X-ray bulbs. They hope and trust that the spirit of work and not that of alchemy will be the prevailing one throughout this whole session. It is very important to bear in mind also that the tendency of alchemical spirit of to-day is the same as in the middle ages. Claims which cannot be substantiated lead to fraud and disgrace. The at first self-deceived but honest alchemist developed into the unscrupulous adept, who, even in those days, commonly suffered severely for his dishonesty. It is an old but true saying which was applied to the alchemists, that one "who begins by lying will end by begging." If, hereafter, one of you abandons legitimate medicine for the practice of some modern alchemical system, it will be largely because you begun the study of medicine with wrong ideas. Now is the time to form the strong habit of letting nothing come up in your work without as far as possible understanding its proper relations and forming right

ideas about it. Then in the end, like the apostle of old, "having done all," you will "stand."

I said at the beginning that I should attempt little didactic instruction in this lecture, and I have kept my word. If the examples I have brought to your attention do not convey the instruction I wish, nothing I can say will do so. You will certainly form some kind of a conception or philosophy of your profession; see to it that it corresponds to the facts as far as they are known; that is, that in it the facts are properly used. The advantage of early, broad, general training consists in this, that it gives the power of correct reasoning. This is why we are insisting more and more upon it as a prerequisite to admission to this school. There can be no proper specialization without it. This is the great value of common school and even college studies. A false utilitarianism says, let the child study only those things he is to use hereafter. A true utilitarianism says, let him learn how to properly use facts, by seeing how they are used in a great many different directions. There is gain in pursuing a number of studies in the beginning, provided enough attention is given to each to see what its principles are and how they are used.

I said also at the beginning that my object was to help you; possibly I have hindered rather by presenting the difficulties in the way. But when there are difficulties in one's path I believe it the part of kindness to speak of them. I believe also that the human mind is so constituted that it finds its truest happiness in overcoming obstacles which it clearly perceives; that, as we find it in physical nature, its greatest intelligent activity is its most healthy condition. Wonderful paradox! the greatest activity, the most perfect rest! The most perfect stability in nature is among the atoms of matter where the motions are the greatest. I spoke of the longing of the soul for rest, and the search of the ages for this rest. I believe we see much clearer the direction in which it lies than they did, and that the direction is diametrically opposite

to the course they took to find it. They looked in unnatural places for that which was close at hand. The attainment to the intellectual, as well as the spiritual kingdom, is by proper co-ordination and use of one's powers, and not by suppression. As the Great Teacher said, "ye say lo, here, and lo, there, but the kingdom of God is within you." Occasionally, even in early time, this truth was clearly perceived, and happiness and contentment followed.

John Beccher expressed it in his quaint way as follows: "I spend my life amid smoke and flames, poison and poverty, but among all these things I live so happy that may I die if I would change places with the Persian king. I think I have my pitcher by the right handle. For while the alchemists seek for gold I seek for knowledge, which is better than gold." So I believe every one finds it who studies nature with right ideas.