

ENDOWED RESEARCH IN PHYSICS.¹

THERE is a subject which has long been in my mind, and which I determined to bring forward whenever I had a cathedral opportunity of doing so; and now, if ever, is a suitable occasion. It is to call attention to the fact that the further progress of physical science in the somewhat haphazard and amateur fashion in which it has been hitherto pursued in this country is becoming increasingly difficult, and that the quantitative portion especially should be undertaken in a permanent and publicly-supported physical laboratory on a large scale. If such an establishment were to weaken the sinews of private enterprise and individual research it should be strenuously opposed; but, in my opinion, it would have the opposite effect, by relieving the private worker of much which he can only with great difficulty, sacrifice, and expense, undertake. To illustrate more precisely what I mean, it is sufficient to recall the case of astronomy. The amateur astronomer has much work lying ready to his hand, and he grapples with it manfully. To him is left the striking out of new lines and the guerilla warfare of science. Skirmishing and brilliant cavalry evolutions are his natural field; he should not be called upon to take part in the general infantry advance. It is wasting his energies, and he could not do it in the long run well. What, for instance, would have been the state of astronomy — the nautical almanac department of astronomy — without the consecutive and systematic work of the National Observatory at Greenwich? It may be that some enthusiastic amateurs would have devoted their lives to this routine kind of work, and here at one time and there at another a series of accurate observations would have been kept for several years. Pursued in that way, however, not only would the effort be spasmodic and temporary, but the energy and enthusiasm of those amateurs would have been diverted from the pioneering more suited to them, and have been cramped in the groove of routine, eminently adapted to a permanent official staff, but not wholesome for an individual.

Long-continued consecutive observations may be made by a leader of science, as functions may be tabulated by an eminent mathematician; but if the work can be done almost equally well (some would say better) by a professional observer or computator, how great an economy results.

Now all this applies equally to physics. The ohm has been determined with 4-figure, perhaps with 5-figure, accuracy; but think of the list of eminent men to whose severe personal labor we owe this result, and ask if the spoil is worth the cost. Perhaps in this case it is, as a specimen of a well-conducted determination. We must have a few specimens, and our leaders must show us the way to do things. But let us not continue to use them for such purposes much longer. The quest of the fifth or sixth decimal is a very legitimate, and may become a very absorbing, quest, but there are plenty of the rank and file who can undertake it if properly generalised and led; not as isolated individuals, but as workers in a National Laboratory under a competent head and a governing committee. By this means work far greater in quantity, and in the long run more exact in quality, can be turned out, by patient and conscientious labor without much genius, by the gradual improvement of instrumental means, by the skill acquired by practice, and by the steady drudgery of routine. Paris has long had one form of such an institution, in the Conservatoire des Arts et Métiers, and

has been able to impose the metric system on the civilized world in consequence. It can also point to the classical determinations of Regnault as the fruits of just such a system. Berlin is now starting a similar or a more ambitious scheme for a permanent national physical institute. Is it not time that England, who in physical science, I venture to think, may in some sort claim a leading place, should be thinking of starting the same movement?

The Meteorological and Magnetic Observatory at Kew (in the inauguration of which this association took so large a part) is a step, and much useful quantitative work is done there. The new Electric Standardizing Laboratory of the Board of Trade is another, and, in some respects perhaps, a still closer approximation to the kind of thing I advocate. But what I want to see is a much larger establishment erected on the most suitable site, limited by no specialty of aim nor by the demands of the commercial world, furnished with all appropriate appliances, to be amended and added to as time goes on and experience grows, and invested with all the dignity and permanence of a national institution: a physical laboratory, in fact, precisely comparable to the Greenwich observatory, and aiming at the very highest quantitative work in all departments of physical science. That the arts may be benefitted may be assumed without proof. It is largely the necessity of engineers that has inspired the amount of accuracy in electrical matters already attained. The work and appliances of the mechanical engineer eclipse the present achievements of the physicist in point of accuracy, and it is by the aid of the mechanic and optician that precision even in astronomy has reached so high a stage. There is no reason why physical determinations should be conducted in an amateur fashion, with comparatively imperfect instruments, as at present they mostly are. Discoveries lie along the path of extreme accuracy, and they will turn up in the most unexpected way. The aberration of light would not have been discovered had not Bradley been able to measure to less than 1 part in 10,000; and what a brilliant and momentous discovery it was! He was aiming at the detection of stellar parallax. This is the type of result which sometimes lurks in the fifth decimal, and which confers upon it an importance beside which the demands of men who wish to serve the taste and the pocket of the British public sink into insignificance.

In a national observatory accuracy should be the one great end; the utmost accuracy in every determination that is decided on and made. Only one thing should be more thought of than the fifth significant figure, and that is the sixth. The consequences flowing from the results may safely be left; such as are not obvious at once will distil themselves out in time. And the great army of outside physicists, assured of the good work being done at headquarters, will (to speak again in astronomical parable) cease from peddling with taking transits or altitudes, and will be free to discover comets, to invent the spectroscope, to watch solar phenomena, to chemically analyze the stars, to devise celestial photography, and to elaborate still more celestial theories; all of which novelties in their maturity may be handed over to the national observatory, to be henceforth incorporated with, and made part of, its routine life; leaving the advance guard and skirmishers free to explore fresh territory, secure in the knowledge that what they have acquired will be properly surveyed, mapped, and utilized, without further attention from them.

As to the practical applications, they may in any case be left to take care of themselves. The instinct of humanity in

¹ Abstract of an address before the section of Mathematics and Physics of the British Association for the Advancement of Science, at Cardiff, August, 1891, by Professor Oliver J. Lodge, president of the section (*Nature*, Aug. 20).

this direction, and the so-called solid gains associated with practical achievements, will always secure a sufficient number of acute and energetic workers to turn the new territory into arable land and pasture adapted to the demands of the average man. The labor of the agriculturist in rendering soil fertile is, of course, beyond praise; but it is not the work of the pioneer. As Mr. Huxley eloquently put it, when contrasting the application of science with the advance of science itself, speaking of the things of commercial value which the physical philosopher sometimes discovers: "Great is the rejoicing of those who are benefitted thereby, and, for the moment, science is the Diana of all the craftsmen. But even while the cries of jubilation resound, and the flotsam and jetsam of the tide of investigation is being turned into the wages of workmen and wealth of capitalists, the crest of the wave of scientific investigation is far away on its course over the illimitable ocean of the unknown."

I have spoken of the work of the national laboratory as devoted to accuracy. It is hardly necessary to say that it will be also the natural custodian of our standards, in a state fit for use and for comparison with copies sent to be certified. Else perhaps some day our standard ohm may be buried in a brick wall at Westminster, and no one living may be able to recall precisely where it is.

But, in addition to these main functions, there is another, equally important with them, to which I must briefly refer. There are many experiments which cannot possibly be conducted by an individual, because forty or fifty years is not long enough for them. Secular experiments on the properties of materials—the elasticity of metals, for instance; the effect of time on molecular arrangement; the influence of long exposure to light, or to heat, or to mechanical vibration, or to other physical agents.

Does the permeability of soft iron decay with age, by reason of the gradual cessation of its ampèrian currents? Do gases cool themselves when adiabatically preserved, by reason of imperfect elasticity or too many degrees of freedom of their molecules? Unlikely, but not impossible. Do thermoelectric properties alter with time? And a multitude of other experiments which appear specially applicable to substances in the solid state—a state which is more complicated, and has been less investigated, than either the liquid or the gaseous; a state in which time and past history play an important part.

Whichever of these long researches requires to be entered on, a national laboratory, with permanent traditions and a continuous life, is undoubtedly the only appropriate place. At such a place as Glasgow the exceptional magnitude of a present occupant may indeed inspire sufficient piety in a successor to secure the continuance of what has been there begun; but in most college laboratories, under conditions of migration, interregnum, and a new *régime*, continuity of investigation is hopeless.

I have at any rate said enough to indicate the kind of work for which the establishment of a well-furnished laboratory with fully equipped staff is desirable, and I do not think that we, as a nation, shall be taking our proper share of the highest scientific work of the world until such an institution is started on its career.

There is only one evil which, so far as I can see, is to be feared from it: if ever it were allowed to impose on outside workers as a central authority, from which infallible dicta were issued, it would be an evil so great that no amount of good work carried on by it could be pleaded as sufficient mitigation.

If ever by evil chance such an attitude were attempted, it must rest with the workers of the future to see that they permit no such shackles; for if they are not competent to be independent, and to condemn the voice of authority speaking as mere authority, if their only safeguard lies in the absence of necessity for struggle and effort, they cannot long hope to escape from the futility which surely awaits them in other directions.

I am thus led to take a wider range, and, leaving temporary and special considerations, to speak of a topic which is as yet beyond the pale of scientific orthodoxy, and which I might, more wisely, leave lying by the roadside. I will, however, take the risk of introducing a rather ill-favored and disreputable looking stranger to your consideration, in the belief—I might say, in the assured conviction—that he is not all scamp, and that his present condition is as much due to our long-continued neglect as to any inherent incapacity for improvement in the subject.

I wish, however, strenuously to guard against its being supposed that this association, in its corporate capacity, lends its countenance to, or looks with any favor on, the outcast. What I have to say—and, after all, it will not be much—must rest on my own responsibility. I should be very sorry for any adventitious weight to attach to my observations on forbidden topics from the accident of their being delivered from this chair. The objection to which I have now hinted is the only one that seems to have any just weight, and on all other counts I am willing to incur such amount of opprobrium as naturally attaches to those who enter on a region where the fires of controversy are not extinct, and in which it is quite impossible, as well as undesirable, for every one to think alike.

It is but a platitude to say that our clear and conscious aim should always be truth, and that no lower or meaner standard should ever be allowed to obtrude itself before us. Our ancestors fought hard and suffered much for the privilege of free and open inquiry, for the right of conducting investigations untrammelled by prejudice and foregone conclusions, and they were ready to examine into any phenomenon which presented itself. This attitude of mind is perhaps necessarily less prominent now, when so much knowledge has been gained, and when the labors of many individuals may be rightly directed entirely to its systematization and a study of its inner ramifications; but it would be a great pity if a too absorbed attention to what has already been acquired, and to the fringe of territory lying immediately adjacent thereto, were to end in our losing the power of raising our eyes and receiving evidence of a totally fresh kind, of perceiving the existence of regions into which the same processes of inquiry as had proved so fruitful might be extended, with results at present incalculable and perhaps wholly unexpected. I myself think that the ordinary processes of observation and experiment are establishing the existence of such a region; that, in fact, they have already established the truth of some phenomena not at present contemplated by science, and to which the orthodox man shuts his ears.

For instance, there is a question whether it has or has not been established by direct experiment that a method of communication exists between mind and mind irrespective of the ordinary channels of consciousness and the known organs of sense, and, if so, what is the process. It can hardly be through some unknown sense organ, but it may be by some direct physical influence on the ether, or it may be in some still more subtle manner. Of the process I as yet

know nothing. For brevity it may be styled "thought-transference," though the name may turn out to be an unsuitable one after further investigation. Further investigation is just what is wanted. No one can expect others to accept his word for an entirely new fact, except as establishing a *prima facie* case for investigation.

But I am only now taking this as an instance of what I mean; whether it be a truth or a fiction, there is not, I suppose, one of the recognized scientific societies who would receive a paper on the subject. (This, however, is mere conjecture. I am not aware that the experiment has been tried.) There are individual scientific men who have investigated these matters for themselves; there are others who are willing to receive evidence, who hold their minds open and their judgment in suspense; but these are only individuals. The great majority, I think I am right in saying, feel active hostility to these researches and a determined opposition to the reception or discussion of evidence. And they feel this confirmed scepticism, as they call it, not after prolonged investigation, for then it might be justified, but sometimes after no investigation at all. A few tricks at a public performance, or the artifices of some impostor, and they decline to consider the matter further.

That individuals should take this line is, however, natural enough; they may be otherwise occupied and interested. Everybody is by no means bound to investigate everything; though, indeed, it is customary in most fields of knowledge for those who have kept aloof from a particular inquiry to defer in moderation to those who have conducted it, without feeling themselves called upon to express an opinion. Some there are, no doubt, who consider that they have given sufficient time and attention to the subject with only negative results. Their evidence is, of course, important; but plainly, negative evidence should be of immense bulk and weight before it can outweigh even a moderate amount of positive evidence. However, it is not of the action of individuals that I wish to speak, it is of the attitude to be adopted by scientific bodies in their corporate capacity; and for a corporate body of men of science, inheritors of the hard-won tradition of free and fearless inquiry into the facts of nature untrammelled by prejudice, for any such body to decline to receive evidence laboriously attained and discreetly and inoffensively presented by observers of accepted competency in other branches, would be, if ever actually done and persisted in, a terrible throwing away of their prerogative, and an imitation of the errors of a school of thought against which the struggle was at one time severe.

In the early days of the Copernican theory, Galileo for some years refrained from teaching it, though fully believing its truth, because he considered that he had better get more fully settled in his university chair before evoking the storm of controversy which the abandonment of the Ptolemaic system would arouse. The same thing in very minor degree is going on to-day. I know of men who hesitate to avow interest in these new investigations (I do not mean credence — the time is too early for avowing credence in any but the most rudimentary and definitely ascertained facts — but hesitate to avow interest) until they have settled down more securely and made a name for themselves in other lines. Caution and slow progress are extremely necessary; fear of avowing interest or of examining into orthodox facts is, I venture to say, not in accordance with the highest traditions of the scientific attitude.

We are, I suppose, to some extent afraid of each other, but we are still more afraid of ourselves. We have great

respect for the opinions of our elders and superiors; we find the matter distasteful to them, so we are silent. We have, moreover, a righteous mistrust of our own powers and knowledge; we perceive that it is a wide region extending into several already cultivated branches of science, that a many-sided and highly-trained mind is necessary adequately to cope with all its ramifications, that in the absence of strict inquiry imposture has been rampant in some portions of it for centuries, and that unless we are preternaturally careful we may get led into quagmires if we venture on it at all.

Now let me be more definite, and try to state what this field is, the exploration of which is regarded as so dangerous. I might call it the borderland of physics and psychology. I might call it the connection between life and energy; or the connection between mind and matter. It is an intermediate region, bounded on the north by psychology, on the south by physics, on the east by physiology, and on the west by pathology and medicine. An occasional psychologist has groped down into it and become a metaphysician. An occasional physicist has wandered up into it and lost his base, to the horror of his quondam brethren. Biologists mostly look at it askance, or deny its existence. A few medical practitioners, after long maintenance of a similar attitude, have begun to annex a portion of its western frontier. The whole region seems to be inhabited mainly by savages, many of them, so far as we can judge from a distance, given to gross superstition. It may, for all I know, have been hastily traversed, and rudely surveyed by a few clear-eyed travellers; but their legends concerning it are not very credible, certainly are not believed.

Why not leave it to the metaphysicians? I say it has been left to them long enough. They have explored it with insufficient equipment. The physical knowledge of the great philosophers has been necessarily scanty. Men of genius they were, and their writings may, when interpreted, mean much. But to us, as physicists, they are unsatisfactory; their methods are not our methods. They may be said to have floated a balloon over the region with a looking-glass attached, in which they have caught queer and fragmentary glimpses. They may have seen more than we give them credit for, but they appear to have guessed far more than they saw.

Our method is different. We prefer to creep slowly from our base of physical knowledge, to engineer carefully as we go, establishing forts, making roads, and thoroughly exploring the country, making a progress very slow, but very lasting. The psychologists from their side may meet us. I hope they will; but one or other of us ought to begin.

A vulnerable spot on our side seems to be the connection between life and energy. The conservation of energy has been so long established as to have become a commonplace. The relation of life to energy is not understood. Life is not energy, and the death of an animal affects the amount of energy no whit; yet a live animal exerts control over energy which a dead one cannot. Life is a guiding or directing principle, disturbing to the physical world but not yet given a place in the scheme of physics. The transfer of energy is accounted for by the performance of work; the guidance of energy needs no work, but demands force only. What is force? and how can living beings exert it in the way they do? An automaton worked by preceding conditions, that is, by the past, say the materialists. Are we so sure that they are not worked by the future too? In other words, that the totality of things, by which every one must admit that actions are guided, includes the future as well as the

past, and that to attempt to deduce those actions from the past only will prove impossible. In some way matter can be moved, guided, disturbed, by the agency of living beings; in some way there is a control, a directing-agency active, and events are caused at its choice and will that would not otherwise happen.

A luminous and hopeful idea is that time is but a relative mode of regarding things; we progress through phenomena at a certain definite pace, and this subjective advance we interpret in an objective manner, as if events necessarily happened in this order and at this precise rate. But that may be only one mode of regarding them. The events may be in some sense existent always, both past and future, and it may be we who are arriving at them, not they which are happening. The analogy of a traveller in a railway train is useful. If he could never leave the train nor alter its pace, he would probably consider the landscapes as necessarily successive, and be unable to conceive their co-existence.

The analogy of a solid cut into sections is closer. We recognize the universe in sections, and each section we call the present. It is like the string of slices cut by a microtome; it is our way of studying the whole. But we may err in supposing that the body only exists in the slices which pass before our microscope in regular order and succession.

We perceive, therefore, a possible fourth-dimensional aspect about time, the inexorableness of whose flow may be a natural part of our present limitations. And if once we grasp the idea that past and future may be actually existing, we can recognize that they may have a controlling influence on all present action, and the two together may constitute "the higher plane," or the totality of things, after which, as it seems to me, we are impelled to seek, in connection with the directing of force or determinism, and the action of living beings consciously directed to a definite and preconceived end.

Inanimate matter is controlled by the *vis a tergo*; it is operated on solely by the past. Given certain conditions, and the effect in due time follows. Attempts have been made to apply the same principle to living and conscious beings, but without much success. These seem to work for an object, even if it be the mere seeking for food; they are controlled by the idea of something not yet palpable. Given certain conditions, and their action cannot certainly be predicted; they have a sense of option and free will. Either their actions are really arbitrary and indeterminate, which is highly improbable, or they are controlled by the future as well as by the past. Imagine beings thus controlled: automata you may still call them, but they will be living automata, and will exhibit all the characteristics of live creatures. Moreover, if they have a merely experiential knowledge, necessarily limited by memory and bounded by the past, they will be unable to predict each other's actions with any certainty, because the whole of the data are not before them. May not a clearer apprehension of the meaning of life and will and determinism be gradually reached in some such direction as this?

By what means is force exerted, and what, definitely, is force? I can hardly put the question here and now so as to be intelligible, except to those who have approached and thought over the same difficulties; but I venture to say that there is here something not provided for in the orthodox scheme of physics; that modern physics is not complete, and that a line of possible advance lies in this direction.

I might go further. Given that force can be exerted by an

act of will, do we understand the mechanism by which this is done? And if there is a gap in our knowledge between the conscious idea of a motion and the liberation of muscular energy needed to accomplish it, how do we know that a body may not be moved without ordinary material contact by an act of will? I have no evidence that such a thing is possible. I have tried once or twice to observe its asserted occurrence, and failed to get anything that satisfied me. Others may have been more fortunate. In any case, I hold that we require more knowledge before we can deny the possibility. If the conservation of energy were upset by the process, we should have grounds for denying it; but nothing that we know is upset by the discovery of a novel medium of communication, perhaps some more immediate action through the ether. It is no use theorizing; it is unwise to decline to examine phenomena because we feel too sure of their impossibility. We ought to know the universe very thoroughly and completely before we take up that attitude.

Again, it is familiar that a thought may be excited in the brain of another person, transferred thither from our brain, by pulling a suitable trigger; by liberating energy in the form of sound, for instance, or by the mechanical act of writing, or in other ways. A prearranged code called language, and a material medium of communication, are the recognized methods. May there not also be an immaterial (perhaps an ethereal) medium of communication? It is possible that an idea can be transferred from one person to another by a process such as we have not yet grown accustomed to, and know practically nothing about? In this case I have evidence. I assert that I have seen it done, and am perfectly convinced of the fact. Many others are satisfied of the truth of it too. Why must we speak of it with bated breath, as of a thing of which we are ashamed? What right have we to be ashamed of a truth?

And after all, when we have grown accustomed to it, it will not seem altogether strange. It is, perhaps, a natural consequence of the community of life or family relationship running through all living beings. The transmission of life may be likened in some ways to the transmission of magnetism, and all magnets are sympathetically connected, so that, if suitably suspended, a vibration from one disturbs others, even though they be distant ninety-two million miles.

It is sometimes objected that, granting thought-transference or telepathy to be a fact, it belongs more especially to lower forms of life, and that as the cerebral hemispheres develop we become independent of it; that what we notice is the relic of a decaying faculty, not the germ of a new and fruitful sense; and that progress is not to be made by studying or attending to it. It may be that it is an immature mode of communication, adapted to lower stages of consciousness than ours, but how much can we not learn by studying immature stages? As well might the objection be urged against a study of embryology. It may, on the other hand, be an indication of a higher mode of communication, which shall survive our temporary connection with ordinary matter.

I have spoken of the apparently direct action of mind on mind, and of a possible action of mind on matter. But the whole region is unexplored territory, and it is conceivable that matter may react on mind in a way we can at present only dimly imagine. In fact, the barrier between the two may gradually melt away, as so many other barriers have done, and we may end in a wider perception of the unity of nature, such as philosophers have already dreamt of.

I care not what the end may be. I do care that the inquiry shall be conducted by us, and that we shall be free from the disgrace of jogging along accustomed roads, leaving to outsiders the work, the ridicule, and the gratification of unfolding a new region to unwilling eyes.

It may be held that such investigations are not physical and do not concern us. We cannot tell without trying. In that I trust my instinct: I believe there is something in this region which does concern us as physicists. It may concern other sciences too. It must, one would suppose, some day concern biology; but with that I have nothing to do. Biologists have their region, we have ours, and there is no need for us to hang back from an investigation because they do. Our own science of physics, or natural philosophy in its widest sense, is the king of sciences, and it is for us to lead, not to follow.

And I say, have faith in the intelligibility of the universe. Intelligibility has been the great creed in the strength of which all intellectual advance has been attempted, and all scientific progress made.

At first things always look mysterious. A comet, lightning, the aurora, the rainbow—all strange, anomalous, mysterious apparitions. But scrutinized in the dry light of science, their relationship with other better-known things becomes apparent. They cease to be anomalous; and though a certain mystery necessarily remains, it is no more a property peculiar to them, it is shared by the commonest objects of daily life.

The operations of a chemist, again, if conducted in a haphazard manner, would be an indescribable medley of effervescences, precipitations, changes in color and in substance; but, guided by a thread of theory running through them the processes fall into a series, they all become fairly intelligible, and any explosion or catastrophe that may occur is capable of explanation too.

Now I say that the doctrine of ultimate intelligibility should be pressed into other departments also. At present we hang back from whole regions of inquiry, and say they are not for us. A few we are beginning to grapple with. The nature of disease is yielding to scrutiny with fruitful result; the mental aberrations and abnormalities of hypnotism, duplex personality, and allied phenomena, are now at last being taken under the wing of science after long ridicule and contempt. The phenomenon of crime, the scientific meaning and justification of altruism, and other matters relating to life and conduct, are beginning, or perhaps are barely yet beginning, to show a vulnerable front over which the forces of science may pour.

Facts so strange that they have been called miraculous are now no longer regarded as entirely incredible. All occurrences seem reasonable when contemplated from the right point of view, and some are believed in which in their essence are still quite marvellous. Apply warmth for a given period to a sparrow's egg, and what result could be more incredible or magical if now discovered for the first time. The possibilities of the universe are as infinite as is its physical extent. Why should we grope with our eyes always downward, and deny the possibility of everything out of our accustomed beat.

If there is a puzzle about free-will, let it be attacked: puzzles mean a state of half-knowledge. By the time we can grasp something more approximating to the totality of things the paradoxity of paradoxes drops away and becomes unrecognizable. I seem to myself to catch glimpses of clews to many of these old questions, and I urge that we should trust

consciousness, which has led us thus far; should shrink from no problem when the time seems ripe for an attack upon it, and should not hesitate to press investigation, and ascertain the laws of even the most recondite problems of life and mind.

What we know is as nothing to that which remains to be known. This is sometimes said as a truism; sometimes it is half doubted. To me it seems the most literal truth, and that if we narrow our view to already half-conquered territory only, we shall be false to the men who won our freedom, and treasonable to the highest claims of science.

I must now return to the work of this section, from which I have apparently wandered rather far afield, further than is customary—perhaps further than is desirable. But I hold that occasionally a wide outlook is wholesome, and that without such occasional survey, the rigid attention to detail and minute scrutiny of every little fact, which are so entirely admirable and are so rightly here fostered, are apt to become unhealthily dull and monotonous. Our life-work is concerned with the rigid framework of facts, the skeleton or outline map of the universe: and, though it is well for us occasionally to remember that the texture and color and beauty which we habitually ignore are not therefore in the slightest degree non-existent, yet it is safest speedily to return to our base and continue the slow and laborious march with which we are familiar and which experience has justified. It is because I imagine that such systematic advance is now beginning to be possible in a fresh and unexpected direction that I have attempted to direct your attention to a subject which, if my prognostications are correct, may turn out to be one of special and peculiar interest to humanity.

AMONG THE PUBLISHERS.

RUFUS C. HARTMANFT, Philadelphia, has prepared a little book which he will publish under the title "Was Abraham Lincoln a Spiritualist?"

—D. C. Heath & Co., Boston, will issue this month Victor Hugo's "Hernani," edited by John E. Matzke, associate in Romance languages, Johns Hopkins University.

—Max O'Rell's new volume of travels, called "A Frenchman in America," will be published by the Cassell Publishing Company, New York, late in October. In this book he gives the humorous side of his experiences as a lecturer, and he has a good deal to say about the people whom he has met, both the interesting and uninteresting ones. Mr. E. W. Kemble has made over 135 illustrations for the book.

—Now that the time of year has arrived when, according to popular tradition, "oysters are in season," every lover of that choice sea-food should be provided with a copy of Professor William K. Brooks's book, "The Oyster: a Popular Summary of a Scientific Study," recently published by the Johns Hopkins Press of Baltimore. The book is intended for all who care for oysters, whether providers or consumers; oystermen, law-makers, or students. Of it President Gilman of the Johns Hopkins University says, in a brief note of introduction to the volume, "So well is the book written that many parts of it are as fascinating as a story."

—J. B. Lippincott Company will publish immediately: "Harmony of Ancient History and Chronology of the Egyptians and Jews," by Malcolm Macdonald; "The Natural History of Man and the Rise and Progress of Philosophy," a series of lectures delivered by Alexander Kinmont; and "Truth-Gleams," a series of essays on the controlling influences in life. Among the new publications to be issued late in the month are: "A Supplement to Allibone's Dictionary of Authors," in two volumes, by John Foster Kirk; "A Handbook of Industrial Organic Chemistry," by S. P. Sadtler, and "Atlantis Arisen; or, Talks of a Tourist about Oregon and Washington," by Mrs. Frances Fuller Victor.