*SOME UNSCIENTIFIC REFLECTIONS UPON SCIENCE.**

SCIENCE has its limitations and often confesses to them more or less directly, so that there must be some justification even from science for the heretical standpoint that I am now taking. Like all limitations, too, those of science are as much a source of danger as of opportunity to science itself. And also as for my being unscientific, it may be well to reflect that in these days any negative term can be looked upon as only an extreme or limiting degree—in one direction or the other—of that which it denies, so that I have at least an even chance of saying something scientifically worth while.

With regard to the limitations of science, it is a commonplace of the day that for accuracy and genuineness or purity science must be (1) independent of life, the subjective interests, whether personal or social, being perhaps science's most unsettling influences, (2) specialistic, the 'Jack of all trades' in science being anything but *persona grata* among scientific men, and (3) positivistic, all conceits about what is beyond actual experience and even all dogma about what seems really present to experience being most arrant heresy. But in every one of these requirements or conditions, that do indeed make science possible, there lurk serious dangers, which I wish to point out and emphasize. Not that they have never been seen or heard of before, but rather that certain things are sometimes so commonplace, so well known, as to be unappreciated, if not forgotten altogether.

So, in the first place, the ideal of objectivism for science tends, just in proportion as it is realized, to bury science in the deep grave of technique. Of course, if one believes in a resurrection, all may yet be well, but many do not or at least would blush to admit any such belief. And just what do I mean by technique? I mean everything that makes scientific work purely mechanical, for pure mechanicalism is the inevitable method of pure objectivism. Scientists have their etiquette about preempted problems or fields of research, their notions about originality as dependent on working in a new field—hence the preemption to prevent transgression or theft of originality, their conceits about bibliographical information, linguistic proficiency and technical phraseology, their satisfaction over 'publication,' 'contribution,' 'production,' and even 'research,' and a very humble deference of each to each among the different branches of scientific enquiry; and under technique I would include all these things as well as the more familiar matters of method and apparatus and material. Physicians, we are told, and not infrequently their patients, suffer from a professional ritual and etiquette, but they are far from being alone in their misery. Scientists are a close second. Of course to deny that technique has its uses would be absurd. The danger, however, not the use of it, is what now concerns us. Technique is one of the enabling conditions of science, but science that gets no further, that is only 'pure' and 'objective' and 'inductive,' is not true science; its much-vaunted observation and experiment may fill a good many pages and a good many volumes, but material, even material in books, and experiments, even carefully reported experiments, are not science necessarily.

True science, as I conceive it, and I think as all are conceiving it to-day with growing clearness, is synthetic as well as analytic, being interested in something more than a decomposable object. It is activity, not

* This paper was read in part at the Baltimore meeting of the American Psychological Association, December, 1900, and *in toto* before the Research Club of the University of Michigan, in May, 1901.

mere passive receptivity; it is invention, not mere discovery; and what so many are pleased to call the real life, subjective as this is, the real life of a person, a society, or a race, is as important to it, as much a warrant of its conclusions, as any object, however mathematically describable, with which science was ever concerned. True science, I say, is no mere knowledge of an outer world; it is invention, the invention of a tool, the making of a great machine, with use of which human life is to become more vital or more effective, more nearly adequate to the world in which man finds himself; it is what a biologist might call an instrument of adaptation to environment. Sometimes this instrument takes visible, wholly material form; sometimes it appears as method in the practical arts; sometimes it is only an atmosphere or point of view, a habit of mind; but, whatever it is, it is useful, incalculably useful, and its invention is science's chief justification.

This, objects somebody, is sentiment, and sentiment of the sort that destroys science, making serious accurate science impossible. I can not possibly agree. Is a man less interested in having a proper edge on his razor because eventually he must use it on himself? Nothing but the truth can ever set anybody free. But, all question of sentiment or of sharp razors or of a truth that liberates aside, the consistent evolutionist is obliged to take the view of science that is here asserted, just as in general he is obliged to think of consciousness as one of the positive conditions of organic development. To be an evolutionist and at the same time to think of consciousness as only an external ornament of life, perhaps a result without being a condition of development, or of science as solely for its own sake, would be nothing more nor less than to stultify one's self completely. For the historian, too, whether evolutionist or not, whose chief business is to remind us that the present is not all, the prevailing devotion to science for its own sake, which also in other times has possessed the minds and hearts of men, can be at best only a passing phenomenon. And then, apart from the standpoints of evolution and history, human society is sure sooner or later to resent what I venture to call the aristocratic temper that pure objective science is all too likely to acquire from the exclusiveness of its ritual or technique or say from its academic dress. Aristocratic temper, whatever its direction, is unquestionably as desirable in social life as it is inevitable; it is incident to the development of all institutions, political, ecclesiastical, industrial or educational; but the resentment which it is sure to awaken is not one whit less serviceable to society, insuring, as it does, among other things the 'extension' of science, the translation of science into life.

So for a time pure science may lord it over applied science, the perfecting of science as a tool being the absorbing interest, and inferior men or at least so-called inferior men may be the unfortunate representatives of science in industry and the arts generally, but in our own day applied science has begun to assume its proper place of honor, and those engaged in it are even often recognized as 'research men,' and in general the use of any tool, which men devise, with never mind how much cloistered seclusion and esthetic fervor, is as necessary as the making. The true scientist, accordingly, can only welcome enthusiastically the many indications in recent times of an offensive and defensive alliance between science and industry, seeing in these a conclusive answer to those who have raised the cry of science's bankruptcy. Furthermore, the conflict between pure science, science as technique and applied science is one in nature, and I think also in time, with that between ecclesias-

ticism and theology on the one hand and practical religion on the other and the close analogy between the two must help to emphasize the danger of the purism, which is the objectivism and technique of science, without seriously reflecting on its usefulness.

But besides burying science in technique, objectivism involves a most interesting expression of conservatism. I am not now thinking of the double truth or the double life which it sanctions so cordially that men can entertain advanced scientific doctrines without feeling them in any serious conflict with the traditional teachings of religion and morality, but something else, perhaps not wholly unrelated to this, is in my mind. Thus, while science is commonly supposed to be advanced and 'up to date,' if anything is, it is so only in a way that needs to be very carefully qualified, for it manages to perpetuate not indeed the letter, but still the spirit of old views. Certainly a purely objective science can at best only give a new material content to existing and time-worn forms of thought; it cannot do that in which progress must always consist, namely, develop and adopt new forms of thought, new categories; it cannot do this without betraying its objectivism. Objective science, for example, has said, relatively to a certain doctrine of creation, that spirit did not precede matter in time, but instead matter preceded spirit, and, except for the excitement of the drawn battle which this startling assertion has precipitated, it can hardly be said to have involved any great advance. Also, while deposing the First Cause, an objective science has made all things causes after the same plan, individual, arbitrary, antecedent causes, and this is only to multiply indefinitely, perhaps infinitely, the offensive creationalism. Not so, some one objects, since it involves a great deal more than mere multiplication, for by making all things causes it brings into science the important principle of the equation of action and reaction, a principle which, turning creationalism fatally against itself, yields the new standpoint of mechanicalism. Readily I grant this, but a purely objective science has no right to any such development; a purely objective science has no right ever to change its standpoint.

Perhaps this does not mean very much. Then let us approach the matter in another way, risking a reference to one of science's pet conceits, the familiar 'question of fact.' It has been for science a 'question of fact' whether matter made mind or mind made matter, whether this or that thing is or is not a cause of some other thing, whether certain very low, mayhap unicellular organisms, show purpose in their activities or do not, are gifted with a natural tendency to social life, a real interest in their kind, or are not so gifted, or—to take one more case—whether the changes in the brain that precede bodily movements are or are not directed by consciousness, consciousness being in the one case in causal relation with the brain and in the other only an idle external accompaniment, an 'epiphenomenon'—but in each one of these questions of fact we can see how the scientist is given to standing in his own light, obscuring the view of what he above all others ought to see. Are mind and matter, cause and effect, purpose, society, brain-process and consciousness such well-established conceptions, as if independent constants in the scientist's formulæ, that mere external questions of fact can be asked about them? Why, when one really thinks about it, to assume, as questions of fact are usually made to assume, such is their natural objectivism, that anything either is or is not something else, is about as blinding and as ill-advised as could well be. It keeps the scientist busy no doubt, eternally busy, as busy as the sportive cat that so hotly pursues her own caudal extremity, but it does

not contribute much that is positive and progressive. To the question, for example, about lower organisms showing purpose or social feeling in their activity the scientist may answer no and be quite emphatic in his answer too, but almost at once he will appreciate that mankind, when scrutinized in the same way, is similarly deficient; and then somehow the wind is taken out of his sails, since purpose and social feeling are not to be so easily disposed of, and the question of fact simply returns for another reckoning, with Shelley's cloud, silently laughing at its own cenotaph. And what is the difficulty? The difficulty is in the assumption that purpose or social feeling is a fixed conception, so fixed and so well known that its presence or absence can be established by an experiment or two on strictly objective principles. No conception is fixed, and a science that entertains a question of fact with its 'either this or not this,' 'either that or not that,' simply needs to betray its objectivism sufficiently to *recognize* that no conception is fixed, and to recognize at the same time—for this is directly implied—that any division of the things of the world into a and not-a or b and not-b is necessarily artificial. In a real universe everything must be true of everything, nothing can be what anything else is not. Let science recognize these things and it will promptly exchange its external objective question of fact for direct internal questions of meaning. Thus, for one of the cases in hand, not Are low organisms social or purposive, but What do they testify as to the real nature of society or of purpose? Being subject to the principle, which I but just now referred to and which I think is not to be gainsaid, that in a real universe everything must be true of everything, that a real universe is really indivisible, the things of man's experience, whatever they be, must always be means to man's understanding of himself, not the affairs of an wholly objective science. What they are not, he is not; what they are, he is. So, instead of denying purpose or social feeling, or even of assuming the possibility of their denial to lower organisms, science should simply seize the opportunity which its experiments afford of a clearer definition of purpose or society. Thus the experiments seem to show, not that there is no purposive activity or social life in low organisms, but that purpose itself, wherever exhibited, is only the urgency of expressing an existing adaptation, an adaptation that is at once realized and even consciously appreciated. A purely objective science could never assume the standpoint here illustrated, but a progressive science, a science for which let us say knowledge is as much a reaction as an action, a reflection as an observation, can take no other.

The conservatism of objective science or the viewpoint in its questions of fact, which the conservatism determines, is the chief reason for the negative attitude of science, so often an object of *just* complaint. Thus, to use still another illustration, for science to assume that God either is or is not, because He must either be or not be what men have thought Him, is simply to beg the theological question altogether, and true science, or at least true thinking, cannot be and should not be identified with such question-begging. Thus, for science's question of fact, a negative answer is a foregone conclusion, inasmuch as the very fact of the question is evidence that a new idea of God is only just below, if not already on the horizon of man's consciousness. What, therefore, we should ask is, not *Is God?* but simply and candidly, *What is He?* The business of science is to accept and interpret experience, not to question its very reality.

But, secondly, there is scientific specialism, a natural concomitant of objectivism, since the objective as innocent of all

subjective relations is necessarily manifold and discrete, and so turns scientific study into many separate ways. The peculiar danger of specialism is that it is almost certain to make vision dim, if not to induce complete blindness, or, as virtually the same thing, to create in consciousness curious fancies, strange distortions of reality, seen not with the eye at all, but with the mind, which is always so ingeniously constructive, so original, so imaginative, and one might even say so hypnotic in its power of suggestion over the senses. Specialism closes one's eyes and makes one dream. It makes the specialist among physicians see his special ailment in every disorder, and every disorder in his special ailment, and this so truly that merely to consult him is to fall his victim. Of course, he can never be wholly wrong, and his unwitting transgressions help discovery, but, nevertheless, his situation is full of humor. And in science generally, the specialist dreams, transgressing his own proper bounds without clearly knowing that he has transgressed. Why? Because thought, which although often apparently suppressed and abused never actually deserts experiment and observation, is so much greater than vision, than mere sensuous perception. In spite of the specialist being all eyes for his own peculiar interest, the thought that is within him, being bound to conserve an indivisible universe in every particular thing, leads him, thoughtless devotee that he is, patiently repeating his sacred syllable, into most wonderful visions, projecting his consciousness to regions of such logical subtlety and marvellous construction as was certainly never known before, unless, perhaps, among those Eastern sages who fed their minds on 'om.' A specialist, he sees the universe, not knowing in his blindness or in his dreaming that it is the universe; and his danger, the danger of all specialism, is that he may never awake.

Thus mathematics and physics and chemistry and biology and psychology, not to say also the social sciences, are dependent upon the visions of specialism. Each of them may indeed be special, but thought insists upon making its object conform to reality, which is never special, so that in each there do and must arise abstractions, logical constructions, for the others. When, for example, a physical scientist insists on seeing his world of material phenomena only physically, while in reality it is and must be a world of chemical process also, and even of vital and mental character, he is bound to admit to his thinking what he will call working hypotheses, formally true to his physical standpoint, but what any outsider, in order to explain why they are hypotheses that work, must call compensating conceptions, in short logical constructions that are substitutes for the neglected points of view. A science's working hypotheses are thus as if doors in the paneling by which the other sciences are secretly admitted to a room that seems tightly closed to all comers. Every science, in short, and this the more as the science is special and objective and exact, entertains the others unawares. Tennyson's 'flower in the crannied wall' is nothing in its all-inclusiveness when compared with a well-developed special science. In a sense that is indeed coming to be widely appreciated, no science ever does or ever can live unto itself alone. It may will to, but it does not and cannot.

But what are these 'working hypotheses' that work because they are 'compensating conceptions' or 'doors in the paneling'? Some illustration of the foregoing is now imperative. Illustration, however, is difficult, very difficult, for a reason which the scientists will allow me to mention. They know too much about the sciences, while I know too little. Still, as too much knowledge is often blinding and so is only a form

of ignorance, the situation is not altogether hopeless. Thus, while it is true that scientists are likely to insist, even in the face of the principle of thought preserving the unity of an indivisible universe in all the varied studies and conclusions of science, that physics is nevertheless only physics and chemistry only chemistry and biology only biology and psychology only psychology, and while also my illustrations must all come from the field of their special sciences and may therefore only set them more firmly in the willful blindness of specialism, still the principle itself, the principle of a conserving thought, is a disturbing influence which they cannot escape, and then besides I am for the moment forgetting and asking them to forget a very important fact of scientific study today. In these times the running together, or merging, of different sciences, as if through something of the nature of a chemical reaction, is a very familiar phenomenon, and it has been taking place with such persistence and confidence as actually to suggest a natural affinity, each of the sciences involved having the rich experience of discovering itself in the others. This fact, then, must make illustration at least less difficult, since in a way that is certain to appeal to science as no mere theory ever can, it proves or goes far towards proving what is to be illustrated. Moreover, specific illustration is hardly necessary in the sphere of the physical sciences or again in that of the social or of the psychological sciences, for within each one of these groups the affinity but just now referred to has been clearly exemplified, as in the interesting case of physics, chemistry and mathematics. Illustration, then, is needed only for the physical in relation to the social and psychological, and to this I now turn.

In articles already published under the titles 'Epistemology and Physical Science —A Fatal Parallelism,'* and 'Physical Psychology,'† I have undertaken to show, and I believe I have at least made a beginning of showing, that the dualism of mind and matter, which separates the physical and psychical sciences, is logically reproduced, as if by a sort of projection, within the special spheres of each. Physical psychology is 'concerned with the substitutes or indirections for mind [for the sort of unity, intensive instead of extensive or qualitative instead of quantitative or vital and spiritual instead of physical, which is always associated with mind] that appear in all the so-called physical sciences,' and corresponding to physical psychology there is a psychological or epistemological physics, in its turn concerned with the substitutes for quantity and matter that are present in all the psychical sciences. The sensuous self, for example, with the atomism that it has always involved psychology and epistemology in, is only as if a projection of the physical on the psychical. Sensationalism, as we all know, has ever been closely associated in history with materialism. And, on the other side, in conservation,‡ in plenitude, in motion as relative, that is to say, as always under a principle of uniformity or constancy, and also as inclining to something like vibration or rotation, in which it is an expression of rest as well as motion, and finally, not to continue what might be a long catalogue, in the infinity of space and time or—as the same thing—of quan-

*See *Philosophical Review*, July, 1898.

†See *Psychological Review*, March, 1900.

‡The case of conservation, in addition to what is to be said here and to what has been said in the two articles referred to above, may be put in this way. Thus is not the 'constant quantity,' not a mere quantity, but a ratio? As a ratio, even if finite, it is, like all ratios, more than merely quantitative, its constancy testifying, not to mere quantitative unity, but to a unity that quite transcends any purely quantitative differences. As ratios all quantities are both finite and infinite.

tity, the physical sciences have 'doors in their paneling' for the silent entrance of psychical. Do you fail to see this? Then, I can now only suggest, and probably I need only to suggest, that every one of these physical notions, either implicitly or explicitly, is paradoxical, and the paradox, whenever it arises, shows the thinker become a traitor to his chosen standpoint, to his accepted forms—in the case in hand, of course, to the forms and standpoint of physical science.* Moreover, such conceptions as conservation and plenitude and vibration and rotation and infinity, dependent as so largely they are upon what is agreeably known as the scientific imagination, are usually recognized as the physical basis of the very possibility of science, which I would now venture to define, not as mind's knowledge of matter, or in general of objective reality, but as mind's knowledge of itself in matter or in objective reality. Science, in other words, even special science, even objective science, is self-consciousness; say a very realistic self-consciousness, the self seen through the mirror of not-self; which, although metaphysical and almost offensive, reminds me and perhaps others of Burns:

> "O wad some power the giftie gie us,
> To see oursels as others see us!
> It wad frae monie a blunder free us,
> And foolish notion."

The bonnie Robert was too much of a specialist in poetry to see that science was the very thing he prayed for.

But now for further illustration of the way in which thought defies specialism and conserves its universe I would mention several important facts, that are certainly not unfamiliar, as follows: Thus the social sciences imply affinity for the physical sciences, in that, besides their more special divisions, they are constantly making appeal to science in all its branches from physics to psychology; and the biological sciences, in addition to their more conventional forms, are becoming most hospitable to psychology, chemistry, and even to mechanics. Again, all the different sciences, however special, are wont to adopt the same general method, as, for example, the historical method, the consequences of which to the cause of pure specialism may easily be inferred. And, lastly, striking analogies, other than that of method, are always easily traceable among the sciences of any particular time. Atomism in physics is contemporary with individualism—consider Democritus and the Sophists—in politics; a monarchical politics with an anthropomorphic creationalistic theology and a heliocentric astronomy; and a Newtonian astronomy, which makes a law or force instead of an individual body the real center of the solar system, with democracy or constitutionalism and inductive instead of deductive logic and naturalistic theology; so that at no time, whatever a scientist's interest, can he fail to have at least a formal sympathy with other sciences. Analogies among the sciences, so often recognized in these times, are not exactly 'doors in the paneling,' but they may be said to make the paneled partitions all but unsubstantial and transparent.

Specialism, then, is more formal than real. The special science needs only to develop to become, and to find itself, universal. The barriers with which it surrounds itself gradually vanish into mere imaginary lines, which only long usage can possibly make seem substantial and opaque, so that specialism by a logic of its own or by

* Thus conservation as quantitative is a paradox since the constant quantity cannot be finite and infinity is not a mere quantity. The plenal medium can be material only if displaced by material things and plenal only if not material and it is used, too, as an immobile, albeit elastic to an infinitesimal sensitiveness, basis of motion. Motion itself is also rest. And infinity, as already implied, is a quantitative paradox, which means a 'door' for quality, for the intensive unity of mind.

the logic of a thought that conserves its universe even in the varied studies and conclusions of the many sciences, is destined to end in the unification of the sciences. To say the very least it is the natural fate of the special science to develop into methods of each other.

Unification of the sciences, however, implying as it does the decline of specialism and so also the decline of objectivism, brings with it the translation of science into life, in short the application of science, of which, in addition to what was said before, I would now speak again, but briefly and concisely, for the positivism of science is still to be considered.

The decline of specialism, which we have found to be natural to specialism, by making the dividing partitions unreal is bound in the first place to free the sciences from that bondage of technique, just as, for example, the decline of religious—or irreligious?—sectarianism, a form of specialism certainly, is bound to free religion from the bondage of ritual. Secondly, it must make the distinction between self and not-self, subject and object, man and nature, only a formal one, formal in the way in which the special sciences themselves are distinguished, since the unity of the objective world is one and the same with the self or subject. This we but just now saw, when we were able to define science as not mere knowledge of an outer world, but self-consciousness, realistic self-consciousness, to understand which only reflect further upon the art and literature so natural to an age of science. Art and literature are self-consciousness. But, thirdly, whether because of the freedom from technique or because the scientist does come to discover his own image in the clearing and quieting waters of science, the decline of specialism, again like the decline of sectarianism, brings what some are pleased to style the liberation of the human spirit, a liberation that means freedom in, not freedom from, the natural world, and what a psychologist would call the development of knowledge into will, in short the application of science. Of course applied science must be not special, but general, because life is general; not ritualistic, but spiritual, because life is not ritualistic, making no fast distinctions between part and part or part and whole; and practically or even intuitively wise or skilled, as well as confidently volitional, not technically learned and esthetically satisfied, because life is not learned, but wise. Yes, the natural decline of specialism means the unification which is also the application of science, and, to bring the matter home, any scientific association, through which the sciences find each other out is really dangerous to the cause of pure, of objective and special science, since it can only forerun the movement of science into life.

But now as to positivism, at once the third condition and third danger of science. It can hardly be necessary to show that this is involved alike in objectivism and in specialism. Positivism confines knowledge to actual experience and to only a tentative confidence in actual experience. Scientific knowledge is positivistic, because it is obscured or refracted by the aloofness of the scientific point of view. Science is aloof from life and—in its specialism—also from itself. Then, when men who would be scientists withdraw, as we say, from affairs, it is as if they had put on distorting and discoloring glasses, through which they would see the world, the 'objective' world. The space and the time, for example, in which they see things are widely different from the space and time in which things are doing, from the space and the time of will and action. The difference is felt by us even in ordinary life, but the extreme attitude of science greatly exaggerates it. For science space and time are quantitative, divisible,

formal, independent of what is in them; for will and action they are qualitative, indivisible, inseparable from their content. Again, the scientists reduce causation to mere uniformity of coexistences or sequences, which is no real causation at all, being only so much passive existence or fatal process; while will or action is causation, the positive interaction of things that are, the active relation and conservation of what was and is and will be. And, once more, science needs elements, while will or life is the eternal denial of elements or anything like them. Says a recent writer:* "It is one of the greatest dangers of our time that the naturalistic (or scientific) point of view, which decomposes the world into elements for the purpose of causal connection, interferes with the volitional point of view of the real life, which can deal only with values and not with elements." Of the danger involved I shall speak in a moment,† but the bondage of science to elements, to thoroughly decomposed reality, is indubitable. And then, in addition to the formal space and time, the empty causality and the unreal elements, that are peculiar to the aloofness of science from life, there are in the special sciences the different 'working hypotheses,' which we found to serve the purposes of protecting conservation against specialism, but which, nevertheless, so long as retaining their projected forms, make science artificial. Science, accordingly, has no choice; it is condemned to positivism. Even the much-vaunted experience of observation and experiment, although our only possible source of knowledge, can never lead to direct knowledge of reality, can never put us face to face with that which is. Even in science we know appearances, not things.

*See Münsterberg's 'Psychology and Life,' p. 267. Houghton, Mifflin & Co. 1899.

†See also Münsterberg's 'Grundzüge der Psychologie' in the *Psychological Review*, May, 1901.

But what now is the danger? The writer quoted above says it is the interference of the scientific with the volitional point of view. With not less truth, however, it is that the two points of view will not interfere, that both science and life will fail to appreciate, as that writer has failed to appreciate, the true import of their incongruity, and so will forever stay apart, the one losing itself in a morbid intellectualism, the other in a dead monotony of mere existence. Whatever be true about their incongruity, life without science is certainly lifeless; science without life, meaningless —as meaningless, as empty, as the proverbial Greek. We know men who lead what we often abusively call the double life. They have their science, perhaps their laboratories and their books and their own pet doctrines, and they have also their social affiliations in business, in politics and in religion; and their life seems double, because their sociology and their business, or their political theory and their party ties, or their biology and their religion, simply will not mix. But is their duplicity as real as it seems? To them, as well as for us looking on, the opposition needs only to grow to make all the science meaningless and all the life dead; certainly a strange, ineffectual opposition; a double life, that can be double only in form, only numerically and that must be tedious and unhappy even in its peacefulness. And what more can be said? This. Such duplicity, the duplicity of science and life as never interfering, is not even possible. *Of course* scientific technique, with its aloofness and its logical constructions, and life that in its special affairs is only conventional and ritualistic, or say, routine in the study or the laboratory and routine in the church or the market place, can never conflict, but routine is never either real science or real life. Witness the avowed, although sometimes forgotten, positivism of technical

science and the unrest, the bravado that is so ill-disguised, of what some call 'life.' Science knows that it does not know, that it can not know, that even conscious man has always moving within him another relation to his world than that of knowledge; and life, as apart from knowledge, shows that it does not live. So again I say that the real danger of positivism, of a blind or forgetful positivism, is that the naturalistic or scientific point of view and the volitional point of view will not interfere with each other. Certainly within the laboratory and the study to keep them apart, to separate theory and experiment, would be fatal to both; the life that we call science needs their constant interference, and with every one of its experiments shows that they are not as incongruous as they seem; but what is the world, if not a great laboratory that is related to the smaller as real life to the theater, as nature to the conservatory, as an unaided vision to the microscope?

Agnosticism is another name for positivism. The positivist, the devotee of pure, objective, special science, cannot but believe in an unknowable, and this belief, in its turn often forgotten, needs always to be recognized as a part, a very important part, of the scientific consciousness, for it is only one other way in which thought conserves its universe. Thus the unknowable, whether seen as compensating for science's aloofness from life or for the dreaming that specialism induces, is a constant safeguard against the abuse of knowledge.

The unknowable is a negative that bears constant witness, not to another sphere which some mind quite different from our own might consciously comprehend, and which we, being intellectually outside, and so only creatures of faith, can merely blindly will, but to another relation than that of mere knowledge, which we *as knowing creatures* have to reality. There is, in short, an unknowable for the single reason that to know is also to will. Or, again, the unknowable is not for knowledge, but for action.

Let us be blindly scientific, insisting on science being only for science's sake, recognizing nothing as worth while but great learning about a Greek particle or a minute insect or a mysterious element, and like a dark cloud there arises and spreads over our view the unknowable, and from this cloud a voice comes: "Only the All is and the All is One and the One is not for knowledge." But as we apply our science, breaking through the walls of specialism, and liberating the will that was for the time their not unwilling prisoner, the sky clears. The one is not for knowledge, but for life; knowledge is not for knowledge, but for will, its natural fulfillment. "The end of man is action, not thought, though it were the noblest."

Alfred H. Lloyd.

TRUMAN HENRY SAFFORD.

A long, active, busy life, devoted without reserve to teaching, to research, to cares of family—such a life of science as that which closed on June 12, in Newark, cannot receive adequate appreciation in the brief space available here. But the friendship of years crowding one upon another will not let pass in silence the death of Truman Henry Safford. A few words of personal sorrow demand immediate expression; leaving a more complete summary of his life's tribute to astronomy to await dignified publication in the annals of those learned societies of which he was a distinguished member.

The friendship of years is no light thing. It was in the latter part of 1884 that Safford paid his first visit to the modest observatory of Columbia College, then situated in 49th Street, N. Y. He found there a stripling engaged in testing a level. The