SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, MAY 27, 1904.

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MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

*THE AMERICAN SOCIETY OF NATURALISTS. WHAT ACADEMIC DEGREES SHOULD BE CONFERRED FOR SCIENTIFIC WORK?**

THE CHAIRMAN (PROFESSOR TRELEASE):

The subject that has been selected for the afternoon's discussion is one of very considerable interest to all of us as investigators, and further, to those of us who are teachers as well—the question as to what academic degrees should be conferred for scientific work. From the time when one of our little people comes home from the primary school with a long narrow strip of yellow paper with various hieroglyphics on it that he has made himself, and with certain blue pencil marks which may read 100, or 90, or 40, we are confronted by one phase of the question that we are to analyze this afternoon. The arithmetical grading of our attainments and our personality begins at the very moment that we go into the kindergarten, and it does not end until a well-disposed clergyman tries to find something good to say of the worst of us when we are through with our life's work. Everywhere between the kindergarten and the grave we are confronted with the fact that a kind of stamp is put upon us in every one of the complications of life that we may fall into.

What are we trying to do as teachers is of course perfectly clear to every one of us. Those of us who are teachers are trying to equip people for useful work in life. The situation is not unlike that of cur-

* Annual discussion, St. Louis meeting, December, 1903. Reported stenographically and corrected by the speakers.

rency in China. I had the pleasure a few weeks ago of listening to a very instructive address on Chinese banking by a scholarly native of that country, who reminded us of the time, in the seventies, when one of our New England firms thought that it would be a very nice thing to take over a lot of trade dollars—a thousand or more, to China, in order that the good standard coin, stamped with the sign manual of a good responsible nation, might be passed into the Chinese circulation, but he stated that before these trade dollars had been in China a month they were all melted down into bullion and the bullion was cast into the 'shoes' current in China—stamped with the imprint of the firms which chose to make them up in this form and guarantee their purity and weight. Now I take it that in this matter of the stamp of educational institutions we are really dealing with the same kind of currency question. Those of us who are called on to train men are turned to for an expression of opinion as to what those men are worth, and whatever that expression of opinion may be, and the value of it, are largely a matter of the convenience of the people our men may be thrown in with afterwards. I think we recognize that all of the percentage gradings, and all of the academic distinctions and classifications, and all of the honors that come in middle and old age, are merely expressions of belief; that the real thing we are trying to do is to make men useful, and that all marks of approval are merely secondary, accessory matters.

If we are agreed on this, however, I think that we are agreed that although evils, they are for the time being necessary evils. It does seem necessary that there should be a good deal of this vouching for people. With the greater complexity of our civilization and of our educational institutions, it becomes more and more necessary, apparently, that there shall be some of this sort of secondary designation, other than that which men can give themselves by going into the market and performing life's work; and for that reason we have this very question of degrees standing out prominently before us as investigators and teachers.

The subject that is before us this afternoon is one that can be made a very fruitful subject of discussion, not with reference to any action that the American Society of Naturalists may take in regard to it, not, perhaps, with reference to individual action that any society may take, but that through discussion some of the undesirable features of the present practise may in time be remodeled and replaced by a greater simplicity, and with a greater expressiveness, perhaps, in what is done.

With this preface to the work before us, I wish to call upon the first of the speakers who have agreed to take part in the discussion this afternoon, President Jordan of Stanford University.

Dr. Jordan:

Mr. Chairman, I was rather hoping that somebody that did not agree with us would come in between you and me, so that I might have something to stir me up to a little enthusiasm, something that would remind us of the old times when Professor Coulter and I fought on the bloody sands of Indiana against most of the other schoolmen of that state.

I have felt in regard to degrees very much as Caligula did when he said that he wished the Roman people had but one neck, so that he could despatch it with one blow. I have felt that it might be well if the degrees could be unified, and, taking them all together, we could abolish them at one blow. But doubtless, as the president has said, the degree is among the necessary evils of our time. Certainly no one institution could abolish degrees without distinct

disadvantage to its students, putting them in the position of eternally apologizing for the fact that they have no degree. The essential matter in regard to degrees, which should always be kept in mind, is that the student should not go out of his way to get a degree. It is a crime in education to force a student to do something that is not the best thing for him, merely to conform to some system. The individual is a thousand times more important than the system. Our work as teachers is really the work of training individuals, not to make them conform to a system unless the system helps on their work. In all of our treatment of degrees we should keep that principle in mind—that the student ought not to go out of his best way. How that best way is to be judged is another question, but there is always one way better than other ways for each particular man.

I believe also that the degree should not be made too much of, and that we should not regard it as something particularly vital. It is simply a handy term for the registration of alumni. I do not believe in making the degree a class label. One reason for separating the degree of A.B. from other bachelors' degrees has been the supposed superiority of the men of classical training. If the classical graduate is really superior, the fact will show. If he is not superior except in name, the assumption that he is so would tend to make him ridiculous. We know as a matter of fact that there is no superiority of classical training over other forms of training for all classes of men. We know that there is no kind of training better for all men than every other form.

I believe very strongly that it is best as a matter of policy for an institution to give the same bachelor's degree for all kinds of academic work that may be approved, whether it be scientific, or classical, or literary, or historical, or whatever it may be. Let the four years' course be marked by the degree of bachelor of arts—of arts because that term is one of long standing, long used in connection with college graduation. Its historic meaning is long since lost, and does not concern us vitally. Of course, the classical course of to-day is not the course of a hundred years ago. There is no historical value to the A.B. There are good reasons why the graduates of one institution should bear the same title. If one wishes to be more explicit, it is easy to specify on the diploma which has been the major subject.

As we know, the degree of B.S. has been and is grossly abused. It is given for short courses on insufficient preparation. It usually means bachelor of surfaces instead of bachelor of science, indicating that the bearer of it has none but superficial knowledge.

The degree of A.M. is a harmless one which means nothing in this country. In some institutions it costs five dollars, in some others two years of study. In some universities it is a step toward the degree of doctor of philosophy, and in other places it is a name for culture work of some kind or for training as a high-school teacher. We had a discussion in the Association of American Universities a while ago, spending several hours on the meaning of the master's degree. The discussion seemed to show very clearly that the degree had no uniform significance. On the average it was simply a convenient way to bring graduate students from other institutions into the roll of alumni of an institution in which they had done advanced work.

The degree which has most significance is that of Ph.D., one which we have brought from Germany. This is essentially a professional degree, the degree of the professional scholar, the professional investigator, as distinguished from the men who are not making their scholarship a profession. Professional degrees are the only ones with

permanent significance and the professional degree of doctor of philosophy should find its cognate in doctor of medicine, and the professional degree of law. Scientific degrees should be called by the same name as any corresponding degrees in scholarship. We should not attempt to split up our courses, separating scientific men from the other men. I think any distinction by way of degrees and badges is rather unfortunate, but that we should grant to all persons with high scholarship the same names and titles so far as these have any value at all. At present professional degrees have very different values. Some are university degrees, representing the professional training of an educated man, and some are trade degrees, showing that a man with or without education has attended lectures and learned something of the trade. The professional schools of some of our universities say: "There are so many men going to be doctors, or lawyers, willing to enter the study of medicine or law at such and such a time for such and such a period. We will take them for what they are and do the best we can for them." The university of higher aims seeks for the best way to train a good physician or lawyer and requires its students to take that kind of training. So long as we have professional schools fitted for such different classes of students, and still lower for persons who can not be called students at all, we shall have a great difference in the value of professional degrees.

I may repeat that I believe that the policy of Johns Hopkins, Harvard, Cornell, and many other institutions, the policy of unifying degrees, by getting rid of superfluous ones, is a movement in the right direction. We do not need more than two non-professional degrees, A.B. and A.M., and the Ph.D. should go along with the other doctors as a professional degree.

The Chairman:

I have several letters on the table, and before calling on the next speaker, I think that in view of what President Jordan has said, this letter from President Eliot of Harvard will be very interesting to you.

In reply to your inquiry of November 18, I beg to state that in my opinion, the best degrees to confer for scientific work, as for all other work, are the degree of bachelor of arts, the degree of master of arts and the degree of doctor of philosophy. In a temporary and provisional way the inferior degrees of bachelor of science, master of science and doctor of science have been used—with some variations of name and corresponding letters—in our country, because the preparatory work at school required of candidates for these degrees has been smaller in amount and inferior in quality than the work required of candidates for the traditional degree of bachelor of arts. This relative inferiority of the scientific degrees now begins to be overcome. When it is overcome there will be no reason for persisting in the special degrees which have the word 'science' in their title. More and more the equal dignity and value of the scientific subjects in comparison with the humanities is recognized. When that recognition is complete and universal, there will be no need of giving one degree for excellence in languages, history or philosophy, and a different degree for excellence in economics, architecture, chemistry or zoology. All good work, in whatever field, ought to be rewarded by the same academic distinctions.

For these reasons I consider separate degrees for scientific work to be undesirable, although provisionally necessary. They have heretofore been degrees of lower standing or repute, and they are likely to continue to be so regarded. I hope that they tend to be abolished. Will you kindly accept this statement as my contribution to the forthcoming discussion before the American Society of Naturalists?

The next of the gentlemen who have agreed to speak this afternoon is President Van Hise of the University of Wisconsin.

President Van Hise:

In considering the subject of degrees, I have thought rather of the trend of development than of what might seem desirable. As all are aware, the A.B. degree

was that of the classical colleges. The B.S. degree arose, as President Eliot has said in his letter, because those interested in the studies leading to the A.B. degree were not willing to accept work in science as equivalent to the traditional curriculum. It is comparatively recently that science work has been generally recognized as of equal cultural value with mathematical and classical studies; only recently that many institutions have come to the point of placing all liberal studies upon the same basis with reference to the A.B. degree. This came about when it was seen either that there must be a degree for every group of studies, or one degree for any group of liberal studies. This was not at first appreciated, and various degrees were introduced for different groups of studies. But when the logical result of this practise was understood, various institutions turned to the A.B. degree for all work of a general cultural nature.

But President Eliot holds that courses in chemistry, architecture, and by implication all courses in applied science, should also receive the A.B. degree. I do not know that I am prepared to go so far as to say that technical training in applied science should lead to this degree. Certainly recent development in this country has not been in this direction. It is now the practise, at least at many large technical institutions, to give the B.S. degree in applied science. This is illustrated by the Massachusetts Institute of Technology.

Applied science is taught in a somewhat different way, with a different spirit and a different purpose from the general cultural studies of the college of liberal arts. Feeling this difference, various institutions which have gone so far as to give the A.B. degree for all pure cultural work, including science, still give the B.S. degree for applied science. It is at least a question whether there is not a sufficient difference in the method and purpose of the college of liberal arts and the college of applied science to warrant a distinction in the degrees conferred by them. Certainly the colleges of applied science are generally using the B.S. degree. They wish to retain it as a stamp showing that their men are trained in science to a definite end. They do not desire the A.B. degree for the courses in applied science, since they feel that this degree does not express what they desire to say in reference to graduates of agriculture and engineering. It, therefore, appears to me that, for the present at least, the use of the two degrees mentioned is pretty well fixed in this country, *i. e.*, the A.B. degree for courses in the liberal arts and the B.S. degree for applied science.

If for all work in liberal arts the baccalaureate degree is A.B., then for advanced graduate work of a grade showing power of productive scholarship and investigation there should be a single degree, and for this place the degree Ph.D. is preferable, since it is the one in common use both in Germany and this country.

THE CHAIRMAN:

These letters that I have seem to fall in very nicely with the speakers this afternoon. I have a letter from President Schurman of Cornell which I will read now, if I may, as being quite appropriate to the remarks of President Van Hise.

It seems to me that the whole question depends entirely upon the point of view from which one looks at it. A distinction might also be drawn, I believe, between baccalureate and advanced degrees.

If we are to consider, as I believe we should, that graduation from the college of arts and sciences (or corresponding department) of a university signifies, regardless of the nature of the studies pursued previous to such graduation, the attainment of a certain stage of liberal culture rather than the completion of a course of preparation for a specific walk in life, then, it seems

to me, this training is best represented by the degrees of A.B. If, on the other hand, it is desired that the nature of the undergraduate studies shall be specifically shown by the name of the degree, I should think that the nomenclature, B.S., were as satisfactory as any for work in science.

Graduate work, however, is primarily specialization, and, as such, might very well be represented by degrees significant in themselves of the nature of the field covered, although here at Cornell the only advanced degrees now granted by the college of arts and sciences are A.M. and Ph.D. In that case, M.S. and D.Sc. seem to be very appropriate for work in science.

In other words, the line of argument that President Van Hise has presented seems to have been followed by Dr. Schurman.

As the next speaker, I shall call on Professor Cattell.

Professor Cattell:

President Jordan has told us that academic degrees belong to the babyhood of culture, and President Butler has elsewhere called them the tinsel of education. These university presidents, however, continue to confer degrees. They doubtless realize that our civilization is semi-barbarous, crude personal adornment being an important factor. It is, perhaps, a sign of progress to put rings through the ears rather than through the nose; if stays must be worn, those should be chosen that interfere as little as may be with the digestive processes. I should like to see academic degrees abolished altogether, or as a second choice to see the B.A. degree interpreted as meaning either bachelor of arts or bachelor of athletics, as the case may be, and then conferred on each college student when he attains his twenty-first birthday. But no individual and no body of individuals can create a new world; we may try to improve existing conditions, but must at the same time adjust ourselves to them. The question before us is not whether degrees should be abolished, but what kinds of degrees should be conferred for scientific work.

There are four kinds of degrees to be considered—those conferred at the close of the college course, those conferred for graduate studies, those conferred for professional work—all of which are more or less confluent, and lastly the degrees conferred as honors. The American college has performed an important service for the country and deserves the esteem and affection in which it is held. But its functions were local and temporary. We can scarcely imagine its introduction into Germany or France; or its survival here to the end of the twentieth century. The high school will give, and in fact now gives, the general training of the first year or two of the old college course, and after this comes the special training of the university and professional school. A kind of country club for young gentlemen of wealth and leisure is scarcely appropriate to a democratic community. We shall probably give the baccalaureate degree at the close of the school course as in France or abandon it as in Germany.

In the meanwhile what kind of a degree should be given for non-professional scientific work? The choice is apparently between the bachelor of arts and the bachelor of science. If there were exactly two kinds of secondary school and college courses, one based on the classical languages and one on the sciences, it would be proper to give to each its appropriate degree. But such clear-cut courses do not exist. According to the last report at hand, there were at Harvard College 249 elections in Greek and 303 in Latin. Those who elected Greek nearly all elected Latin, and there were not in the twenty-four courses in the classical languages as many different students as in a single course in history, economics or geology. One course in Latin given by three professors, one adjunct professor and

one instructor was attended by three students. There were about two thousand students in the college, electing about ten thousand courses, and the classical languages represented about one twentieth part of the average college education of the Harvard bachelor of arts. This degree means that the student studied Latin at the secondary school, not that he followed a different course in college from that of the student who receives the B.S. degree. But the bachelor of science degree unfortunately does not mean that the student has had a scientific education. It means usually that he has not studied Latin at school and has probably entered college with easier requirements. It is said that to receive the doctor's degree at Heidelberg without honors is a certificate of idiocy. A degree that simply means that a student has not studied Latin as a boy, that his parents did not send him to a fashionable preparatory school, that he perhaps entered college with lower requirements and pursued a shorter course, can scarcely be held in high esteem, and a society of scientific men can not rejoice to see the name of 'science' attached to it.

If we were drawing up a Napoleonic code, probably no one would propose to give different kinds of degrees for different kinds of college work. Where the field was clear Johns Hopkins and Stanford adopted one degree only. Chicago, it is true, took the three conventional degrees, and students of commerce become bachelors of philosophy; let us hope that idealism will be radiated from the packing houses of the city. Cornell, Michigan, Minnesota, Wisconsin, Texas and other universities have abandoned the multiplicity of degrees. In some institutions the professors of classical languages, having lost the substance, cling to the shadow of the bachelor of arts, but unwisely as it seems to me, for their nakedness is uncovered. Thus, according to the last catalogue at hand, there were 2,248 undergraduate students in the University of California, of whom only 284—107 men and 177 women—were in the course leading to the A.B. degree.

I should prefer to see the bachelor's degree conferred with specification of the institution and major subject—bachelor of Harvard in classical languages, bachelor of Michigan in zoology, etc., but this is doubtless out of the question. It seems that for scientific work at college the bachelor of arts degree should be awarded unless the bachelor of science degree can be given a proper standing.

Substantial agreement has been reached in favor of granting the doctorate of philosophy for about three years of graduate work with research, without reference to the direction of work or to the character of the first degree. Harvard, Princeton and one or two other institutions have the degree of doctor of science, but it is seldom conferred. The difference between the D.S. and the Ph.D. at Harvard is that in the case of the former the man may not have studied Latin in the secondary school. Harvard, in order to be consistent, established the M.S. degree three or four years ago, but it was wisely permitted to die in infancy, and the jewel of consistency must be abandoned or secured by doing away with the D.S. The evidence that a man is worthy of the doctorate of philosophy should be given by the publication of the thesis, the appeal being made to experts throughout the work. An oral defense of the thesis before the faculty became antiquated in Germany before we borrowed it. In my opinion the doctorate of philosophy is a professional degree, signifying practically that the recipient is competent to teach and to carry on research in his special subject. All teachers can not be original thinkers, nor should investigation be confined to a few teachers. Physicians,

engineers and others should be educated by research and to research, and there is no reason why they should not receive a degree signifying the accomplishment of original work and the promise of its continuation. The doctorate of medicine has in this country lost any meaning beyond the following of three or four years of routine work. I see no special objection to doctorates of engineering, pathology, etc., but the doctorate of philosophy is quite as suitable. I object to the distinction between liberal and technical studies, as applied to the subject studied, but there is an important difference in the attitude of the student. A student might receive the A.B. or B.S. degree as a sign that he is a well-educated man, and at the same time the professional degree, such as E.E. or C.E., as an indication that he is prepared to practise a certain profession. Then later he could be given the doctorate, if he proved himself competent to advance knowledge.

I am not greatly interested in the question of honorary degrees. I should suppose it might be well to reserve the LL.D. degree for public men, including college presidents and benefactors, and to use the doctorates of science and of letters for the two main lines of productive activity. But, at a matter of practise, the LL.D tends to become a first-class degree and the others second-class degrees. It may seem slightly pedantic for Herbert Spencer to have declined all honorary degrees; but if the members of a society such as this would unite in ignoring them it would be a modest reform.

President Jordan:

May I rise for a few words more? I believe that Stanford University is the only one to grant the degree A.B. at the end of a four years' course of which the major subject is engineering. When the university was organized I wrote its first constitution and put in the degree B.S. for engineering courses. When the faculty met, they decided that the purpose of the engineering courses was not essentially different from the others. They led men toward the profession of engineering. Professor Marx, especially, insisted that the engineering proper should be largely graduate work, and that the spirit of the undergraduate work should not be essentially different from that of other scientific departments. For such reasons the faculty voted to give the degree A.B. for this work. Since then I have not found enough objection to the arrangement to bring the faculty together for a reconsideration. The classical men seem to be satisfied with the thing as it is, and the engineers are looking for the time when engineering shall be a professional subject to be pursued for two years after granting the bachelor's degree. Engineering students are brought more closely to the others by this arrangement, and the more unified the student body is the better. We should have no reason for considering a change unless, as suggested by President Van Hise, all the other institutions should agree to reserve the degree of B.S. for the first four years leading to technical work.

The Chairman:

It seems to me, gentlemen, that these remarks of Dr. Jordan are very suggestive, indeed, as to what is really needed in the entire matter of degrees. The universities of the country which give degrees of course can get together in regard to what they do, and very greatly simplify and very greatly strengthen their attitude in regard to it.

Dr. Cattell has spoken in a very brief way of honorary degrees, and what he said in regard to honorary degrees reminded me of a little experience of my own this last summer. I was botanizing in Mexico, and I ran across a gentleman—a member of the

faculty of one of our large universities—who was prosecuting some field work in another department of science. I had not before met him, but was familiar with his work, and I was rather surprised in the course of conversation to find that he had not the doctor's degree. As he was a young man (men are sometimes compelled by circumstances to take to the harness before they have entirely equipped themselves) and not in what might be called a permanent life position, I was rather surprised that he had not this degree, and when I put a question to him about it, I found that the feeling which has been expressed here in several shapes was very strongly fixed in his mind—that the doctor's degree was hardly worth having, and to him it took this shape: That he was an investigator; he was making his mark; he was getting along; he knew how to do research work; he was already getting recognition as an accomplished investigator; and it was hardly to his interest to make certain sacrifices of money and the disposal of his time that would be necessary in order to get a diploma that would enable him to write Ph.D. after his name. He said: "I have students in my own department who are going to be Ph.D.'s in a short time, but who, I know well enough, will never do a piece of work that I have not thought up and that they do not carry out under my plan. They will get Ph.D.—and of what use is that designation to me?"

This opens one of the very important questions which I hope may come into the discussion this afternoon—that of securing recognition of those professional attainments which distinguish the man who has gone into the field of science from the man who has taken the equipment and bought the armor and weapons but has never gone any farther. And it may be that there is in the future the possibility that the degree which is sometimes conferred for scientific work, doctor of science, which I hold—which I should be sorry to see go, but which is fast becoming entirely obsolete as an earned degree, may be conferred as recognizing the successful investigator in science as distinguished from the gentlemen to whom Professor Cattell would give the degree of LL.D.—almost the one honorary degree that is open to-day for those whose names appear in 'Who's Who.'

The next speaker, who, though not an active college president, has had ample experience as a college president, and at the same time, like all of the speakers, is a distinguished investigator, is Professor Coulter, of the University of Chicago.

PROFESSOR COULTER:

I believe that this subject, discussed in a meeting of scientific people or those who have scientific inclinations, is likely to get the sort of handling it would not get anywhere else. We are really somewhat out of sympathy with a great many of the notions that cluster about these degrees, and in our scientific training we seem to have gotten away from any sentiment that belongs to them; and still it remains a fact that most scientific men, in the back of their minds at least, think a great deal about them. Therefore, we are really discussing not what might be called desirable, but that which is a fact. I am free to say that this discussion to me is the consideration of how we shall regulate an evil that is among us, but which we are not yet ready to abandon entirely.

By this preface I wish it understood that I am not favoring degrees, but some rational way of conferring them.

The first point to be made in the discussion, and apparently the chief storm center thus far, is in connection with the bachelor's degree. The old contests to which President Jordan referred in his

opening remarks, in which he and I were concerned, had chiefly to do with the position that in the splitting of courses of study the splitting of the bachelor's degree became an absurdity. The compromise proposition suggested by President Van Hise is exactly the same that was used at that time in reference to what was called the bachelor of sciences. There is the same difficulty in determining what is culture. I have come to wince at the use of that term in discussions concerning education. The attempt to differentiate cultural and non-cultural studies has always ended in confusion. It is not so much a distinction between subjects as between teachers, and this distinction can not be formulated. Any subject or any set of subjects leading to any definite useful end in the hands of a real teacher will result in that stage of advancement, that intellectual status, which the bachelor's degree marks. My claim is that if work in engineering, for example, does not result in such intellectual growth as deserves the bachelor's degree it should be stimulated in that direction. In other words, I can not see how any definite distinctions can be made in the undergraduate period of intellectual development. It is our habit to abolish all distinctions later, and the logic of the situation seems to show that we are not describing kinds of training, but are marking distinct steps in progress.

The only other reason I should have for abandoning the distinctive term 'science' in connection with the bachelor's degree is out of respect for science itself. The amount of science to be obtained in any undergraduate course is so insignificant that to make it distinctive of a degree is somewhat absurd, especially if it be implied that the holders of the degree are in any sense trained in science. No such objection can be urged against such use of the word 'art,' as its significance in this connection has long since become conventional. As investigators we know what undergraduate work means, and it is hardly worth differentiating when it comes to degrees. It is only a certain amount of activity during a certain time; and the bachelor's degree came to be agreed upon as a convenient and well-understood statement of a certain stage in intellectual progress. Therefore, I have long been in favor of what has been called a 'blanket degree.'

I believe that the master's degree, that comes next in the order of succession, is to-day probably the worst abused degree. I have had a notion that it might be made, at least in scientific circles, a most useful degree, and I have been so using it. I have called it a 'side-track' degree. There are certain well-intentioned students who do graduate work, but who have not the slightest initiative in the way of investigation. They can acquire and they can retail any amount of second hand information, but they can not do original thinking. For them this degree is useful. In other words, I look at it as a teaching degree, given for what might be called teaching ability as distinguished from the ability to investigate. Many a student who is seeking a doctor's degree may be comfortably side-tracked by the master's degree. Thus, if distinctions are to be made, the master's degree might well be retained as a teaching degree, a degree of position also, but not recognized as a distinct scientific degree involving investigative ability.

The doctor's degree has been mentioned by all the speakers and with unanimity of opinion. The only thing needing emphasis is the great importance of granting it carefully, and only to those who are really investigators. Great violence has been done to this degree, and great discredit brought upon it, simply because there has been no way of side-tracking those who do not deserve it. The definite time requirement

gets us into trouble, for it is not easy to make a student who has fulfilled the residence requirement understand that he has not earned his doctor's degree. Such universal action has been taken to prevent the conferring of honorary degrees of this type that I presume scientific bodies need not emphasize it further. But in certain quarters there is still prevalent the correspondence method, by which the student is exempt from residence or scientific work of any type. It is baldly a reading degree, with an essay based upon the reading.

The chairman has suggested a subject that seems to me well worth consideration. We know that there are tremendous differences in the subsequent history of those who have received the doctor's degree, but there has been no method of differentiating them. I do not know how large a percentage of those who actually achieve the doctor's degree are never heard from afterwards. There ought to be a distinction between these still-born doctors and those who continue to live. I can not propose any method, but the chairman has suggested that Sc.D. might be reserved for this purpose and conferred upon those who have continued to investigate and have become real members of the scientific fraternity. Of course, one may say that these men are known already, but we are considering the subject of conferring degrees, not the subject of their abolition.

THE CHAIRMAN:

Possibly an extract from another letter that I have here may come in rather appropriately here. The gentleman, whose name I will not read in connection with the letter, wrote this in response to a letter that I sent him some time ago:

* * * My own opinion is that degrees take their value from the man who receives them, and not *vice versa*. I have a Ph.D. as an assistant who is a valuable helper but can't spell the English language in an ordinary letter, and I know several others who have gained the degree by passing the required examinations and writing a thesis, but of whom science will never be a gainer; so the excessive anxiety of some of our friends as to the bestowal of the degree upon those who, though not college men, are known over the world as contributors to knowledge, seems to me rather silly. However, 'many men, many opinions.'

The plan of the executive committee has been to have the gentlemen who have thus far spoken to you this afternoon speak with the knowledge that they were to be called upon for short addresses; but it is considered very desirable that when possible these annual discussions before the American Society of Naturalists shall partake really of the character of discussions, and I trust that in the next fifteen minutes—because we do not need to adjourn before a quarter after four in order to hear Professor Rutherford's lecture—some of the gentlemen who have not come here prepared to speak may favor us with some remarks. The matter is before the society for discussion.

PRESIDENT JORDAN:

I think that all granting of honorary degrees is subject to great abuses. To use it for spectacular purposes is to destroy its dignity. Governors, senators, donors often merit it, but sometimes they turn it into a farce. The honorary degree of LL.D. is only rarely conferred upon professors, the class of men most worthy of such honors, whereas a college president expects to receive it every time he puts on his gown away from home. It is safer to use degrees only as certificates of fruitful residence.

THE CHAIRMAN:

I think that possibly before allowing other speakers to claim the floor, I may read extracts from another letter, the signature of which I will not read, but it is particularly pertinent to the subject. This gentleman says:

Your letter makes me wish that I could go to St. Louis, for it is a good work, that of trying to lessen the abuse of honorary degrees. * * * Every learned man, be he scientist or humanitarian, should insist on all occasions that honorary degrees should be given only for academic distinction, and never be given under any circumstances whatever to a politician, a soldier or a business man (as such). * * * has sinned grievously (along with the rest) in this matter, and she should be publicly and severely blamed (along with the rest) for debasing her degrees in this manner. * * *

I trust that others who are here, whether members of the society or not, will now take part in the discussion.

Professor Burrill:

I suppose if this matter could be settled for ourselves here this afternoon it would be very easy. I have a suspicion, however, that whatever we say or do here will not wholly settle the matter outside. It seems to me that the evident tendency of late has been to differentiate degrees along the lines suggested by President Van Hise. It seems to me that already in a great many of the leading institutions the precedent exists, as suggested by President Jordan, that would permit the degree of B.S. to be accorded for a course in applied scientific work; then, we might well enough have the A.B. degree for all of the courses not tending directly towards a professional pursuit. The degree of bachelor of science possibly may not be the proper one for those taking an engineering course, a course in agriculture, etc.; but that seems to be the one that has been pretty generally adopted for that purpose. In the University of Illinois the matter had been discussed some years ago, and lately it has been revived. The degree of bachelor of science was given to students who had taken major work in any science. Now the degree of A.B. is given to all students except those that take courses in engineering, in agriculture and in the new school of commerce. The last has not been settled. I take it, however, that the degree of A.B. will be used there.

There is another thing, however. Whether it is settled thus or in any other manner that seems to be satisfactory, no person taking a course in civil engineering would care for the A.B. degree compared with the degree of C.E. His work is shown pretty well by that degree, the degree of civil engineer, and though they are not so well established, the degrees of mechanical engineer and electrical engineer follow in the same line. Then there is the difficulty about the candidates in architecture. There are several very prominent architectural schools in our country in which students prepare themselves directly for the profession. They confer the degree of B.S. or B.Arch., followed by M.Arch., and finally perhaps by D.Arch.

These professional degrees are given either immediately at the end of the course of four years, or after some further course of study. If I may quote again the institution with which I am most familiar, the degree of bachelor of science is given at the end of four years in the courses of engineering, and then after a further year's work, usually directly following in the line of the specialty—really professional work—the C.E. or M.E. or M.Arch. degree is given. Something like this, I think, must be done; this terminal degree—perhaps we may call it master's degree—must be specialized, whether or not we differentiate the bachelor degree. I am of the opinion, as I say, that the trend of the country, of the institutions, is in favor of making this distinction.

The Chairman:

Are there other speakers? If not, the time for adjournment is rapidly approaching. Before adjourning the meeting I should like to say that as Professor Bur-

rill has pointed out, if we were met together this afternoon to settle this business for ourselves, we probably could so settle it, though we are not likely to settle it for the world at large. But one feature of the Naturalists' discussions has been, as I have watched the discussions, that the members of the society get together to consider in a particularly interested spirit matters which they do not propose to settle, but from the analysis of which they hope that a current of thought may be started which will ultimately result in good. For that reason we have had speakers this afternoon who are representative of geology, zoology, botany and psychology, and who are representative of the country from the Atlantic to the Pacific. I think that we may congratulate ourselves that, although the audience that has listened this afternoon has not been large, the discussion may be brought, perhaps, before a larger audience, and will perhaps start a current of thought in a useful way that will in time contribute to a solution of the problem.

I am going to read one more letter, again without the signature, but a letter from one of the strongest executives of one of the strongest universities in the country:

> I wish very much that I were able to cooperate in the discussion which you propose. Unfortunately, my presence is out of the question, on account of an important previous engagement for the very day which you name; and I am not yet quite ready to send any brief formulation of my views on the degree question. I do not believe that the time is quite ripe for such radical measures as I have in mind; and I would rather that those who think that they can do some good by moderate reforms should have every chance to make their experiments unimpeded by destructive criticism. If those who believe that conservative reform is possible can prove their case I shall be very glad. I should wish * * * to be in a position to cooperate with them on any measures which might give promise of reform. Then if reform measures fail the radicals will have a clear field.

The meeting was then declared adjourned.

SCIENTIFIC BOOKS.

Wilhelm Ostwald: Von PAUL WALDEN.

IT is well known that in December last the twenty-fifth anniversary of the doctorate of Ostwald was celebrated in Leipzig. On this occasion a 'Jubelband,' being the *forty-sixth* volume of the *Zeitschrift für physikalische Chemie,* and containing original papers from thirty-four of Ostwald's former students, was presented to him. The 'Jubelband' contained a brief sketch of Ostwald's life and work by van't Hoff, but the book under review deals with both in a much fuller manner.

Walden discusses the life of Ostwald in five periods: 'The Youth in Riga, 1853–1871'; 'The Student in Dorpat, 1872–1875'; 'The Teacher in Dorpat, 1875–1881'; 'The Professor in Riga, 1881–1887'; 'The Professor in Leipzig, 1887 up to the present.'

Ostwald does not seem to have been a marked success as a gymnasium student, and not to have taken his work in a really serious manner until he came to Dorpat. His first scientific publication, which appeared in 1875, shows the bent of his mind at the early age of twenty-two. It bore the title, 'On the Chemical Mass Action of Water.' This was soon followed by his 'Volume Chemical Studies,' which are now recognized to be works of real permanent value.

That tremendous activity and power to work, which is possessed by Ostwald to an unusual degree, began to manifest itself during the Riga period. It was during this period that the first edition of the great *Lehrbuch der Allgemeinen Chemie* appeared—the book which led to the organization of the modern school of physical chemistry. It was in Riga also that the *Zeitschrift für physikalische Chemie* was founded. This was to be the official organ of the new physical chemistry which was just being organized, and has probably contributed more to the development of this branch of science than all other publications, in that it brought together in one place