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, FEBRUARY 14, 1902.

CONTENTS:

MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

*THE RELATION OF THE AMERICAN SOCIETY OF NATURALISTS TO OTHER SCIENTIFIC SOCIETIES.**

WITH the first year of the new century new conditions have arisen which profoundly affect all problems of cooperation between the national scientific societies. The project which emanated from the American Association for the Advancement of Science to establish Convocation Week has made, as you all know, so great progress that we are now meeting for the first time in this week set apart by the action of numerous universities for the purpose. The Association also has sought to establish wider and more numerous affiliations, such as long existed between it and several important national societies. For many years it has been the rôle of the Society of Naturalists to act as the organ of affiliation for societies which are concerned with the various branches of natural history, and which have been accustomed to meet during the Christmas recess. But the Association is now intending to meet at this period and we may safely entrust the function of establishing affiliation between the representatives of the various sciences in America to this larger body which can include all the branches of science.

A few words as to the history of our

* Annual discussion before the Chicago meeting of the American Society of Naturalists and Affiliated Societies.

Society. It was founded in 1883 under the title of the Society of Naturalists of the Eastern United States. It owes its birth to the action of Professor Hyatt in formulating and proposing the plan, in accordance with which the Society was actually organized, and in interesting others in its establishment. The first secretary was Professor S. F. Clark, now of Williams College. The first meeting was a small gathering at Springfield, Mass., on the 10th of April, 1883. Unfortunately Professor Clark was obliged to resign his office as he was going abroad. For some time it seemed doubtful whether the Society would get beyond its first meeting. I was then asked by Professor Hyatt to act as secretary, and during the remainder of that year I carried on an extensive correspondence with the professional naturalists of the country and nearly all of those who were invited accepted membership.

It was then decided to hold a meeting in New York, December 27 and 28 of that same year. We started with 109 original members, of whom there still remain in the Society not less than 39. At the close of the first meeting the membership had risen to 133 and we have now nearly 250. The original scope of the Society was to have papers on methods of investigation, on technique, on museum administration and devices and on methods of instruction; and in fact at our early meetings many such papers, both of value and of interest, were presented. In 1886 the name was altered to '*The American Society of Naturalists.*' You are all familiar with the gradual change which has come about and know that at present our functions at our annual gatherings are confined to a discussion on some topic of general interest, to a social dinner and to the presidential address. Many of these addresses in the past have been of a noteworthy character, and we are anticipating an address from our president this year which will well sustain the high standard set by even his most distinguished predecessors.

The most important achievements of the Society have been somewhat different from what was foreseen at the time of its organization. It has, of course, accomplished a great deal in the general promotion of natural science. Its meetings have done that. But perhaps more important than this somewhat general fact have been certain specific results which have been attained by the Society. It was, I think, the very first society of national scope which confined its membership strictly to professional scientific investigators, and the rule adopted by the Society for determining what constituted a professional naturalist was very strict and has been well enforced. Many other societies have this same quality of membership, having, in many different branches of science, been formed from our example. Collectively they represent the very best that there is at the present time in American productive scholarship. We may, therefore, claim as one of our most essential and significant achievements the generation of our affiliated daughter societies. They are all characterized by a seriousness of purpose and intensity of scientific work, which can not by any means be always matched by what one encounters in the meetings of foreign societies. Our American societies to which I have referred meet for earnest, scientific discussion. They take but little time for anything else. How striking a contrast there is between the meetings now being held, with each day filled by a long series of valuable papers before each society, and the gatherings, such as many of us have attended in Europe, where a few hours only are kept for the strictly scientific meeting, and many for excursions, picnics and balls. I remember attending an anniversary of one of the oldest scientific societies on the

Continent. The celebration occupied three entire days; the scientific meetings almost four hours. May we not claim it as a merit to thus maintain a higher standard for national scientific meetings than we find in other countries?

Another important contribution of our Society was the introduction of winter meetings. We were the first, I think, to use the Christmas vacation regularly for this purpose. Now many societies use it and experience has shown that it is the best time in the whole year, under American conditions, for the holding of national meetings. It is, therefore, from our example that the demand for the establishment of Convocation Week arose.

The fourth achievement is the introduction of discussions of broader scope in which topics of common interest to those in allied branches of science are debated by high authorities. Such discussions do much to broaden our views and increase our appreciation of the solidarity of all science.

Now as to our future. I have already expressed my conviction that we should resign our function as the central body of affiliation in favor of the American Association, which, being so much larger, and so much wider in its scope, can undertake this work of affiliation on a larger scale and therefore more efficiently. The Association has adopted our plan of meeting during the Christmas holidays so that the substitution will be easy. It seems to those of us who have been interested in these plans that it will be of great value to the science of the country to have from time to time a great gathering, so great that its mere magnitude will impress the public and impress our public authorities. Science has yet to make in this country enormous demands from the public for support before it will attain the proportions which are indispensable for the maintenance of the national welfare. It is a duty, therefore, both to science and to the country, for every scientific man to contribute what he can to make known the needs of science. We depend wholly upon the dissemination of such knowledge for our resources, whether we get them from generous private individuals or by State or national legislation. But it must be remembered further that though affiliation is valuable, bringing together great numbers at one place is not always the wisest plan. Therefore it is necessary that every affiliated society should preserve absolute freedom and that it should be understood between the Society and the Association that the former may meet with the Association or not, as may be deemed expedient each time by the Society. There should be no compulsion from the Association, and I think it will often happen that one or several societies will find it advantageous to meet apart. The only absolute obligation which the affiliated societies ought to assume is the election of one or more delegates to represent the Society upon the Council of the American Association. It is hoped that by this means the Council will become, so to speak, a national senate representing the scientific interests of the country, and representing them very fully. Such a senate will have great influence and may exert its influence from time to time to the advantage of the country. It can speak with authority in regard to problems of legislation, of education and of scientific organization. It might make effective protests, as, for instance, against the outrageous system of duties upon scientific apparatus by which all our work is now impeded; or against the public clamor recently made in one of our States for the reduction of the income of the State University; or against the abuses of arbitrary and ignorant authority at some of our universities, of which we have heard during the last year.

If we resign this part of our work to the American Association, will there remain

enough for us to do to make the perpetuation of our Society desirable? I think clearly, Yes. Even if we could do only what we are now doing—viz., keep up our annual discussion, our dinner and our presidential address—I should say we had in these purposes justification for our continued life. But I believe that we can take up a new task of affiliation which will solve one of the problems which we must solve. It is not enough to have great national meetings. We need besides less formal and more local meetings. The great distances in our country render this important. I should like, therefore, to suggest for your consideration an entirely new plan, viz., that of forming a series of local organizations or branches of our Society. There might be one such organization for example for New England, another for New York, a third for the Middle Atlantic States, a fourth for the Central States and a fifth for the Pacific coast. Each one of these branches could hold meetings for the presentation of scientific papers and invite to the meetings all the local members of the societies now affiliated with us. These meetings might last one or two days and could be held at a time of year when they would not in any way compete with the larger national meetings during Convocation Week. In that way the freedom of the individual societies affiliated with ourselves will be in no wise affected. Competition between ourselves and the American Association will be entirely avoided and the demand, which is real, earnest and well founded, for local meetings, will be answered. It would, moreover, contribute usefully towards the general organization of science throughout the country. That organization I believe to be of the greatest importance. If we look back on the history of science in this country we should probably all agree that the most important step ever taken to promote it has been the establishment of what are commonly called post-graduate courses at our principal universities; because these courses offer varied and excellent opportunities to train young men seeking discipline in science in order to become scientific investigators. But may we not say that to form a wide-reaching organization of science, national in extent and power, is a yet more important step destined to rank among the great achievements of the century upon which we are just entering? We have learned from our political organizations that numerous independent states and a central government work harmoniously and increase by their cooperation and power the welfare of all. So in our organization of science let us profit by this political example, and though we favor the organization and the strengthening of the central power, let us never forget that every body of men which joins in the organization must also be free. If we make 'freedom and affiliation' our watchwords, we shall escape many perils and conquer success.*

Charles Sedgwick Minot.

I shall speak to the following motion: Resolved, that the American Society of Naturalists authorizes the naturalists of the Central and Western States to organize a branch of that Society to meet at Chicago. That a committee of three be appointed by the president to arrange the details of the relation of the Eastern and Chicago branches and to provide for a joint meeting of the two branches at intervals of two or three years alternately in eastern and central territory. I shall not take time to argue the importance of annual meetings

* The original address was delivered from brief notes, with no thought of publication. In writing the article I found it impossible to recall the original discourse accurately, but I think the substance of it is unchanged except that certain parts of momentary or local interest have been omitted. C. S. M.

of naturalists. I shall not try to show how they aid in the development of science. All of us are willing for the love of research to work ten to fifteen hours a day; but it is the coming meeting at which we have announced a paper that stimulates us to work all night. Furthermore, as scientific men have no longer time to read, if it were not for this annual treatment of fifty doses of papers taken in fifty quarter hours we should be more ignoramuses than savants. I assume, therefore, that it is agreed that naturalists should get together once a year.

The question is: How inclusive should these meetings be? Some naturalists, even of the Mississippi Valley, urge that all of the naturalists of the country should meet together every winter. That is not practicable. As evidence it is only necessary to point out that if it were possible it would have happened already. As a matter of fact, the proportion of naturalists from the Central States attending the meetings of the American Society has always been small. At the present meeting, despite the most cordial interest of the eastern naturalists, we are all regretting the absence of many of our eastern friends and colleagues. Again, the experience of the American Association for the Advancement of Science proves that the great majority of the naturalists of one section of the country will not exceed a certain limit of time and expense to attend meetings in another section. At the Boston meeting of the Association 666 members, or about 74 per cent. of those in attendance, were from the Middle and New England States. At Denver, with great attractions for a summer meeting, there were 82 such members in attendance, or 27 per cent. of all attending. From the nature of the case you can't draw definite limits of distance and expense for the regular attendance of naturalists on meetings. But experience indicates that most naturalists will not travel regularly more than for about fifteen hours to attend a meeting, nor spend more than fifty dollars. In other words, an institution that will regularly send a majority of its naturalists to a meeting must be within 500 miles of the place of meeting. These facts teach that it is futile to hope that all naturalists of this country will meet regularly together; or even that those east of the Rocky mountains will do so.

A second proposition is that the Naturalists' meeting should be held in successive years in different sections of the country to meet the needs of the naturalists located in those sections. Thus, it might meet successively in New York, Chicago, Denver and San Francisco.

The objections to this plan are too obvious to require debate. It does away with the precious opportunity of an annual meeting of the naturalists of any one section of the country. Local societies would spring up to fill the need and the American Society would be sapped of its strength by them. The advancement of science demands that naturalists gather at least once a year.

A third proposition was made by a committee of the American Society of Naturalists at its last meeting. It is that the name 'American Society' should be abandoned. That the eastern society should reassume the name of 'Society of Naturalists of the Eastern United States,' with which it started. That the naturalists of the Central States might then form an independent and coordinate society. This plan would be a good one, perhaps, if the central and eastern sections were sharply marked off from each other or were politically distinct as, thank God, they are not. The Boston naturalist of this year will very likely be located in Chicago next year and the Michigan naturalist of a decade ago is a scientific leader in New York to-day. We change houses with facility, but we do not change

the flag to which we owe allegiance and we don't want to change more than possible our scientific comradeship. We of the Mississippi Valley, if called east at Christmas time, would like to be able to attend the eastern meeting of naturalists as rightful members; and if any eastern naturalist (pro tempore) were in Chicago or vicinity at the time of our meeting, it would give us pleasure to realize that it would be his meeting also. We don't want to have the naturalists of the country artificially separated by geographical boundaries.

The fourth proposition is based on the national political principle. It suggests the organization of local, self-governing branches bound together by a central organization. For the present two of these branches seem necessary—one meeting in the east; the other at Chicago. It is proposed, further, that the two branches should meet together every third year, that is, once in six years we in the west will go east, and once in six years the east will come to the west. We should all try to attend these joint meetings, thus to renew old acquaintances and to make new ones. It may, however, appear better to try to meet together every other year; I trust we shall have a discussion of that point.

I have assumed above that the central naturalists will meet in Chicago. This is a local matter, but I take this occasion to refer to the fact that if we draw a circle of 500 miles radius, having Chicago as a center, it includes 99 per cent. of the naturalists who have met here in the past and it is generally agreed, I think, that no other point in the Central States would be so convenient to so many.

The plan here proposed has been opposed on the ground that it means disunion and tends towards the breaking up of the American Society. Precisely the opposite will be the effect. By this plan some hundred or more naturalists of high rank in the Central States will be added at once to the membership of the Central Society which will then become truly an *American* Society of Naturalists. At the same time that *continuity* of work that depends on a regular attendance of members will be gained.

C. B. Davenport.
University of Chicago.

In viewing the relations of American scientific societies in general, and of the American Society of Naturalists in particular, it is needful to occupy some platform; and since the limitations of time will permit no more than a hasty glance, a platform of two planks may suffice. The first of these has to do with the rate of progress of American science, and the second is connected with the trend of this progress; for it is not to be forgotten that while the maker of things moving begins with direction and proceeds toward rate, the interpreter of natural movement begins with rate and then proceeds to ascertain trend or direction—nor is it to be forgotten that the study of institutions is still in the interpretative stage. So the first plank may be defined as Advancement, while the second may be called Coordination.

To one in the thick of the turmoil it is not easy to keep note of the tremendous rate of scientific progress in America during recent years; for no adequate units of measure of intellectual activity and attainment have yet been devised. A suggestion may be found in the development of university facilities, since our universities partly lead and partly reflect our progress in science. Without tabulating the statistics in detail, it would seem safe to say that during the first half of the nineteenth century—*i. e.*, from 1800 to 1850—the university facilities of the United States were doubled; that during the next quarter-century, from 1850 to 1875 (despite the shock

of the Civil War—perhaps partly by reason of it) they were doubled again; that from 1875 to 1890 they were once more doubled; and that during the last decade of the old century the doubling was again repeated, so that the nineteenth century went out with at least sixteen times the university facilities (including endowments, etc.) of her incoming. Nor is this the end; for present indications are that our university wealth will double again within the first five years of the new century. Even this is not all; for the fin de siècle university is scientific—an institution for research into the unknown as well as for the preservation of the known—in far larger degree than was the university of 1800. So the university mete shows that American science is advancing in a geometric ratio, an increasing rate in which the rate of increase is still increasing with increasing rapidity. Any other measure gives similar results: Reckoning what may be called state science in terms of appropriations for its maintenance, the growth, from Olmsted's Geological Survey of North Carolina, beginning in 1823 at $250 per year, to our present two-score of state surveys and related institutions, has been even more vigorous than that of our universities; while our direct federal appropriations for scientific work, beginning with a few hundreds in 1811, passing the million mark about 1870, and now rising above ten millions annually, give eloquent testimony of national advance in knowledge-making at an ever-increasing rate. A still more striking measure is afforded by the growth of our scientific societies—or will be when the statistics are tabulated. Yet all these measures, impressive though they be, are little more than symptoms attending the permeation of a healthful serum throughout the body of American citizens; for our average citizen, whose ancestors in 1800 planted potatoes in the dark of the moon and sniffed witchcraft and black art afar, is now a devotee of the methods of science as well as of rational interpretations of nature, and looks to the Agricultural Department or the Smithsonian Institution or the neighboring university for standards of practical thought—even if he half complies against his will, and is half of old opinion still. It is a hopeful sign of the times that American science, measured by any standards, is advancing more rapidly than our fast-growing population or quick-increasing national wealth—that it is indeed drifting into its true place in the lead of our industrial development. Such is the Advancement of American science.

Turning now to Coordination: The advance of science is largely—indeed wholly, in the last analysis—dependent on social development; and the law of social development is integration. The ways along which integration proceeds are many: The growth of the family into the clan and of the clan into the tribe, and the union of tribes into confederacies, with the ultimate welding of these into nations, all represent a process of integration peculiarly instructive to students of institutions, scientific and other; the steady breaking down of racial barriers, the world-wide blending of blood and culture, the merging of laws and languages, and the diffusion of cults (whether of faith or of works) according to their fittingness for the several stages of intellectual development, all represent ways of social integration—ways whose name is legion, and whose ramifications and osculations it were needless now to follow. Yet he who would fairly view the growth and relations of our voluntary associations for scientific research can not afford to neglect the analogy of primitive society in its growth from clan to tribe, and thence on and upward along the noble course of intellectual strengthening and human betterment. Now the germ of the clan is a

family bound by ties of common interest; and its analogue in scientific organization is the group of kindred spirits working to a common end, like the half-dozen geologists who later formed the American Society of Geologists, the precursor of the American Association for the Advancement of Science. The clan itself is an enlarged family, comparable to the same half-dozen geologists and their fellows when the magnet of knowledge-making drew them into the closer union of definite organization; while the tribe may be likened to the permanent association defined and bound by articles and constitutions and by-laws. The likeness between the primitive tribe and the society of specialists is much more than a fanciful parallel—indeed the analogies are many and close, too many for counting and too close for discussing in brief space; it must suffice to accept the analogy and pass to the application. The significant point is that the tribe, after reaching a certain (*i. e.*, uncertain) magnitude, either multiplies by fission (breaks down beneath its own weight, in other words) and so forms subtribes which are eventually confederated on the basis of higher laws, or else passes directly into more or less definite confederation with alien tribes. It is no less significant that the confederated tribes long retain their integrity, just as do the component clans in many instances and the constituent families in all; so that the confederacy becomes a sort of hierarchy of interdependent groups, presaging the interdependent townships, counties, wards, municipalities, judicial districts, representative districts, States, and other collective units of enlightened society. Now accepting the analogy between the tribe and the voluntary scientific association, the application is simple; the association may either multiply itself by fission (*e. g.*, into sections), or in some other way prepare for reorganization on a more comprehensive plan; yet the broader organization need not interfere with the original affinities and affiliations, any more than the Seneka Indian was made less a Seneka by the Iroquois confederation, or the citizen of Chicago is less a Chicagoan because he is a native of Illinois and a citizen of the United States—as well as a Mason, a Presbyterian, and a free-trade Republican. The plank of social integration is too broad and too long for easy trimming into a three-minute platform; but fortunately it tells half the story in itself.

Such are the great fact and the fundamental principle to be borne in mind in our search for the best way of future progress for the American Society of Naturalists—the fact of unparalleled Advancement, and the principle of institutional Coordination.

The Society of Naturalists is conspicuous among American scientific societies in many ways, notably for its habitual exaltation of the scientific spirit above the letter of organic law and hence for unprecedentedly rapid and vigorous growth—indeed this Society, more than any other, may be regarded as the type and expression of modern scientific activity in America. Founded primarily to meet the needs of serious students of science, incidentally as a foil if not an antidote for the peripatetic pleasuring and jocose junketing charged against an older organization, it has kept even pace with the tremendous scientific progress of the last two decades, and has become a leading power in guiding scientific thought and shaping scientific policy. Naturally, in view of its phenomenal growth, it reveals signs of that fission whereby all social institutions prepare for reintegration on a higher plane. True, the laxity of the law is such that the original organization is not unduly constrained; yet, as a nucleus for a group of affiliated societies, its vitality is diffused to the benefit of the group rather than concen-

trated in the sole interest of the unit. The career of the Society from 1883 up to the present seems to have been normal, fully in accord with the times, and beyond reproach; its present function as a nucleus for special societies—*i. e.*, subtribes, in the analogy with primitive socialry—would also seem to be ideal; yet the question arises, May not the naturalists assume a larger rôle on the stage of American science? And this in turn evokes another: If so, how?

In seeking answers to these queries, the mind turns at once to broader affiliations and stronger affinities than those already developed within the Society of Naturalists; and among the first of the possible affines, thought rests on the American Association for the Advancement of Science, that older organization of which the younger body is, in some measure, the reciprocal if not the antithesis. It is to be remembered that the Association, also, has reached the stage of fission, or of reintegration on a higher plane, the stage being marked partly by increasing autonomy of the component sections, partly by the affiliation of several special societies, each a power in its specialty and all an immeasurable force in shaping the science of a nation. Originally an agency of diffusion and direct advancement combined, the Association for a time was mainly devoted to the former function; of late, thanks largely to the influence of the affiliated societies, it seems to be resuming the original function of direct advancement through its own activity and through fostering kindred societies, so that its present aims are so nearly akin to those of the Naturalists that the two organizations might well cooperate, or even confederate, for mutual advantage and the common benefit of American science. The possible modes of cooperation, and the possible lines of confederation, are too many for present discussion; but it may be held, in the light of analogy with primitive socialry as in that of current experience, that neither cooperation nor confederation need involve loss of autonomy, or efficiency, or dignity, on the part of either organization.

Out of the many possible lines of action leading to coalition between the two most vigorous and virile of our voluntary scientific societies, one or two may be urged: The American Association for the Advancement of Science has already decided to hold a winter meeting in Washington during the Convocation Week of 1902–3, and it has just been decided by this body to hold its annual meeting at the same time and place. Now it is suggested that the American Society of Naturalists take the requisite steps toward admitting representatives of the Association to its Council, and toward securing representation in the Council of the Association, preferably at this approaching meeting, and if not then, at the earliest possible occasion; it is also suggested that this Society take early steps toward enlarging and strengthening its Council in such manner that the administrative bodies of the two organizations may attain parity of power. It need hardly be said that the joint meeting would serve, and better serve, every purpose of separate meetings; and it need hardly be added that one effect of the joint meeting would be to increase common membership in the two organizations, and thus to strengthen the already strong bonds of common interest.

In another place* it was pointed out that a need of American science to-day is a delegate organization—a Senate of Science—in which our many and constantly multiplying local and special voluntary associations of scientific men might be equitably represented in a body not too large and unwieldy for effective work in coordinating lines of research and keeping in touch with national progress; and it was suggested

* SCIENCE, N. S., Vol. XIV., 1901, pp. 277–280.

that the Council of the American Association might well serve as the nucleus for such an organization. To-day a still more promising nucleus for a national scientific organization of unprecedented dignity and power may be glimpsed through eyes of hope; for it is within bounds to anticipate joint meetings of the Councils of America's two representative organizations of science, and joint action with all the strength of union, at no distant day.

W J McGee.
Bureau of American Ethnology.

It is not long since a gathering as representative of American science as the present one would have been a very different kind of audience. It would have been much smaller, without men enough specially representative of any one branch of knowledge to warrant them in meeting together as a section, but composed of men practically all of whom would have heard with interest and discussed with intelligence any paper on the program.

Recent years have brought about a marked change in science as in other things. Material prosperity has made it possible for more men than formerly to devote themselves to the acquisition and diffusion of learning, and the means and appliances at their hand have increased to no less a degree. With this has come, as a means to the performance of the more difficult tasks of research, specialization and attendant division of labor, so that the scientific organizations are now commonly not only larger, but far more complex, and one often goes away from a meeting with something like an intellectual dyspepsia, induced by the many and extremely varied courses offered on the program.

In another important respect conditions have greatly changed. The time was when the great distances lay beyond the workers in science. To-day, because of the development of the whole country, they lie between the workers, not equally, but in such a manner as to cause a concentrated eastern and a more scattered western population. Though distances are now traveled in hours that formerly required days, the expenditure of time and money involved in passing these great distances is so great as to seriously interfere with the holding of truly national meetings, and I desire to express my full appreciation of the action of this society in setting aside a geographic restriction of its constitution in order that this most successful meeting might be held in Chicago. Shortly before leaving home I received a letter from a friend, in which regret was expressed that the eastern botanists who commonly meet in conjunction with this Society had not felt it wise to set aside a like provision of their own constitution, so that they are now meeting in the east, and adding that, much as would be gained by meeting with the affiliated societies now in session here, it did not seem quite right to depart from their custom and so deprive the younger men, not blessed with a superabundance of this world's goods, of a meeting that they desired and were entitled to, but for which they could not travel far.

In our childhood we all learned the fable of the man who one day brought in an armful of twigs, and, handing them one after another to his son, asked him to break them, which was readily done; but when a like number were closely bound together into a bunch, they could not be broken nor even greatly bent. I believe it was the schoolmaster who first made practical use of this particular demonstration of the strength that lies in union, but before my own time he had abandoned it because of the greater flexibility of the unit. Business men have recently begun to make much and profitable application of the principle, and as, in manufacture and

traffic, material results are quickly available for the testing of changes in organization and management, they are rapidly securing both strength and economy and efficiency of administration, by combination. If the century just closed is likely to stand out prominently in history as that marked by specialization and differentiation, that on which we have just entered appears likely to take place as that in which rational union, coordination and centralized organization form prominent features; and this is likely to be as true of the machinery of instruction and of research as it is of business combinations.

Professor Minot has very thoughtfully and logically presented the bearing of this line of thought on this society and the affiliated organizations. Difficulties may be experienced at first in perfecting the details of the most useful and workable organization, but they are likely to be seen and overcome, and I have little doubt that the great Washington meeting that we are all hoping to attend next winter will initiate a federation of scientific interests that, without losing in productiveness, will gain an almost irresistible strength which will be productive of great good in many ways.

But in this centralization of interests those who can not travel great distances to attend the general meetings should not be forgotten. I feel that while none of us who can attend the great meetings can afford to miss them, those who can not go to them should be given every help and encouragement in holding meetings at places convenient to their homes. I have assumed that your committee, in inviting me to take part in this discussion, did so because they wished the point of view of the central botanists represented. On this assumption I have tried as far as possible to ascertain the feeling of those botanists, and I think I may say without impropriety that the botanists now meeting in connection with this Society feel the need of a local organization, and have taken steps toward its formation, though, in view of the discussion to be held this afternoon, possible action by this Society this evening, and the announcement of a general meeting of the central naturalists called for to-morrow morning, for the consideration of the same question, they have deferred their final action until to-morrow. Whatever they may believe desirable for the furtherance of their more immediate interests, I am confident that their support may be counted on for all wise concentration, and that at all times, those who are able and free to attend the general meetings may be counted on to do so, while those who must stay nearer home will prove willing to act in unison with the central body on all matters of scientific importance where concerted action is needed, while they anticipate no refusal of the full power of the general organization in any matter concerning which it is proper for them to ask support.

WILLIAM TRELEASE.
MISSOURI BOTANICAL GARDENS.

THERE are evidently two subjects under consideration by the Society, and these are only indirectly related. One is the subject of cooperation, affiliation, or more organic union between the American Society of Naturalists and the American Association for the Advancement of Science; and the other is the organization of local branches of the Society of Naturalists, or sectional societies having a similar field and affiliated with that general organization.

Assuming that the time of meeting of the American Association is to be changed to Convocation Week, there seems to be a practically unanimous judgment favorable to a meeting of that society and the Society of Naturalists at the same time and place, and to a close coordination or affiliation of the work of these societies. I can see how

certain practical difficulties would arise from the meeting at the same time and place of two societies or groups of societies so largely similar in character and scope—meetings of the Botanical Section of the American Association, and of the Society of Plant Morphologists affiliated with the Naturalists' Society; meetings of the Zoological Section of the American Association, and of the Society of American Morphologists; and so on—but I presume that these matters have all been considered and that means of adjustment will readily be found. As to the soundness of the idea, I cannot see that there need be any doubt.

With respect to the formation of a local society in the central states, to be affiliated in some way with the group of societies in session here at this time, I think the only subject upon which difference of judgment might possibly arise is that of the method of the affiliation. It seems to me that in the nature of the case we shall finally be forced to form sectional societies in most of the branches of science represented by the existing organizations. As the scientific population of the country becomes more equally dispersed over its whole area, we find this area too large to permit general annual meetings of those most interested and most likely to profit by them. The distances are so great as practically to prohibit attendance upon the part of many members, and the number presenting papers in each society or subdivision is such as to crowd the programs unduly, diminishing the interest and value of the meetings. We need a satisfactory geographical unit of assemblage for scientific meetings, one not so large as to make attendance a burden upon those living on the outskirts, and yet large enough to permit a satisfactory subdivision of the programs of societies into sections corresponding to the subdivisions of the subject matter. From what we have seen during the last two years and at the present meeting, it seems to me quite clear that the states of the Mississippi Valley—now coming to be known as the Central States of the Union—should form one such unit of assemblage. Indeed a society of naturalists has already been formed for this area, and has had two highly successful meetings, definite organization having been delayed merely with a view to the issues of this meeting. Probably other such sectional societies might be organized to advantage (if not now, before many years), all to be associated as divisions of a more general organization for the country as a whole.

On the supposition that such a society is now to be organized here, the subject of its relations to existing societies will come up for settlement. In this connection it is helpful to notice the difference in organization of the Society of Naturalists and that of the American Association for the Advancement of Science. In the former there is one general society which serves as a bond of union for special societies, each independent in organization and management, but associated by affiliation with the general body, the latter being scarcely more than an administrative convenience. In the American Society for the Advancement of Science, on the other hand, there is a more compact general society, with subdivisions, called sections, formed mainly for program purposes. In the American Society of Naturalists we have had, thus far, no sections in the latter sense, but only affiliated societies, and I am inclined to think that this method of organization should be continued as local societies spring up in response to local requirements. I would rather, in short, see the naturalists of the Central States organized under the form of an independent but affiliated body than in the form of a section of the national society.

I doubt also the advisability of attempt-

ing to fix in advance the place of meeting of the proposed new society or section or to determine unnecessarily any detail of its policy by a resolution passed by this body at this time. If its members should prefer peripatetic meetings to those held at one fixed point, I think it should be possible for them so to determine, especially as that is now the policy of the whole group of societies associated in this organization.

I am obliged to you, Mr. Chairman, for the opportunity to participate in this discussion, which I owe to your courtesy only; and I have spoken merely on a few points which have occurred to me as I listened to those who have preceded me.

S. A. FORBES.

UNIVERSITY OF ILLINOIS.

'A HAND apart from the rest of the body is not a hand,' said Aristotle, and modern psychology shows that each of us exists only in his relations to others. Writing and the printing-press have made science possible by permitting intercourse between those separated in time and space, but they have not done away with the necessity for personal contact. Correspondence schools can not replace universities, nor do journals and books make needless the coming together of scientific men. The organization of academies and societies has been an essential factor in the development of modern science. Two or three hundred years ago the men of a neighborhood began to meet to discuss scientific questions. Fifty to a hundred years ago, when railways made it possible, national associations were established. As the sciences became differentiated, the academies and associations met in sections, and special societies were established in each country for different sciences. These societies or their members now meet occasionally in international congresses.

We have indeed at present a somewhat bewildering array of scientific societies which have arisen in answer to special needs. It is time that the methods of science should be applied to their proper coordination. The two closest bonds of union are common interest in a subject and local proximity. We have, as a matter of fact, national societies for nearly every science, and local academies in nearly all our larger centers. When there are enough students of the same subject in the same place we have the natural unit; these groups should unite on the one hand to form the local academy, and on the other hand to form the national society. The national societies should be parts of a great national association. The presentation and discussion of research belong to the special societies; the coordination of the work of different sciences, legislation on behalf of science as a whole, and the representation of science before the intelligent public, belong to the national association. For the transaction of business, this association can no longer be a plebiscite, but must be a house of delegates representing the scientific interests of the country.

The American Society of Naturalists, with which we are at present more especially concerned, represents certain sciences and a certain region; it does not form an integral part of what appears to be the trend of scientific organization. Historically our society has performed a service of immense value. In the limitation of participation in its work to scientific men, in delegating special papers to special societies affiliated with it, in its discussions of questions of general scientific interest, and in its choice of midwinter as a time of meeting, it has set an example to the American Association. In recent years, however, the American Association has maintained the same scientific standard, and we have practically one group of scientific societies meeting in midsummer and an-

other in midwinter. The greater power of a general association is indicated by the fact that all the societies meet in summer under the auspices of the American Association, whereas at present the national societies are meeting not only here in Chicago, but also in New York, Philadelphia, Rochester and Washington. The greater influence of a national association is again shown by the fact that it has been able to secure from our universities and colleges a special convocation week in midwinter. This could not have been accomplished by our Society representing only certain sciences and a certain region.

Hereafter the chief meeting of the American Association will probably be held in convocation week, and the national societies devoted to special sciences will probably meet with it. Our views as to the future functions of the Society of Naturalists depend on how we answer two questions. Should our special scientific societies be national or sectional? Should they meet at the same time and place? To me it seems that the special societies should surely be national, or American, with local sections. A national society for each science will ultimately be essential for purposes of publication and for legislative functions. An annual or occasional meeting of those engaged in the same kind of work is of the utmost importance—scientifically, professionally and socially—and should be maintained in spite of the sacrifices of time and money imposed by the large area of our country. It seems to me further that our national societies should meet together. It is economical to make local, railway and other arrangements, once for all. Most of us belong to more than one society and like to meet friends following different lines of scientific work. Indeed, sharp lines can not be drawn between the sciences; we have astrophysicists, electrochemists, general biologists, physiological psychologists, and the like, who would be divided by separate meetings. There are judicial, legislative and executive functions, in which all men of science should unite, and for their accomplishment a general meeting is essential. Then, lastly, the weight of science is impressed on the general public only by a meeting of sufficient magnitude.

The limits of a thousand words do not permit an attempt to emphasize the importance of national scientific societies and of a general congress of scientific men, and after all the logic of events is the strongest argument. We *have* national scientific societies, and they *do* meet in groups—nearly all the sciences in the summer, with the American Association, and the biological sciences in the winter, with the Society of Naturalists. The meetings of the American Association have, it is true, been interfered with by summer holidays, summer heat and the winter meetings; and the winter meetings of the American Society of Naturalists are threatened with a local division. It seems reasonable, however, to assume that next year, at least, all our societies will meet together at Washington in convocation week.

Supposing there to be a general annual meeting, say once in three years at Washington, once in the eastern states and once in the central or western states, what should be the function of the Society of Naturalists? It seems that the general arrangements should be left with the American Association, covering all the sciences and the whole country, and having permanent and salaried officers. Our society might hold separate meetings in the east when the national societies meet in the west. I myself, however, regard this as undesirable. Should the Society of Naturalists then be disbanded, having accomplished its work? I think not. There is place for a compact organization within

the American Association representing certain sciences and a certain region. The original objects of the Society—the organization of scientific work, the teaching of science, the conduct of museums and the like—still need an organization. Our discussion, our public lecture and our dinner with a presidential address should not lightly be abandoned. Within the Royal Society and the British Association there have been clubs, primarily social, but exerting great influence on the policy of the larger organizations. The National Academy performs valuable functions as a select association composed of some of our more eminent scientific men, and the Society of Naturalists, composed of some of our more efficient and public-spirited students of the natural sciences in the eastern states can accomplish much, in the future as in the past, for the advancement of science.

J. MCKEEN CATTELL.
COLUMBIA UNIVERSITY.

THE ASTRONOMICAL AND ASTROPHYSICAL SOCIETY OF AMERICA.

I.

THE first winter meeting of this Society was held at the Cosmos Club, Washington, D. C., Monday, Tuesday and Wednesday of Convocation Week. Sessions for the reading of papers were held both morning and afternoon, on Monday and Tuesday, and on Wednesday morning. The maximum attendance of about fifty was reached on Tuesday.

Twenty-eight new members were elected, and it was decided to hold the next meeting of the Society at Washington during Convocation Week, 1902–3.

A number of the members lunched together both on Monday and Tuesday at Barton's, and on Monday evening attended a dinner at the same place. The president of the Society presided, and among the most delightful features were the after-dinner speeches of Professor W. W. Campbell, Professor George E. Hale and Professor S. I. Bailey. If a similar function is held at the next meeting it is hoped that the ladies of the Society will more generally follow the example of the two present at this time.

On Tuesday evening President and Mrs. Newcomb received the members of the Society and numerous invited guests at a conversazione held at the Arlington Hotel. During the evening papers illustrated by stereopticon were read by Mr. Percival Lowell on Mars, by Professor S. P. Langley on personal equation and the infra-red spectrum, by Professor George E. Hale on a comparison of the results obtained by photography from the forty-inch refractor and the two-foot reflector of the Yerkes Observatory, and by Professor W. W. Campbell on the work of the Lick Observatory eclipse party in Sumatra and the nebula surrounding Nova Persei.

After the reading of these papers the guests were invited into an adjoining room to partake of still another astronomical treat and refreshments. Here the room was fitted up with numerous transparencies and photographs from the Harvard College Observatory, from the Yerkes Observatory, from the Lick Observatory and from the United States Naval Observatory.

On Tuesday a number of the members visited the Astrophysical Observatory of the Smithsonian Institution upon a special invitation to the Society from Secretary Langley.

At the adjournment of the Wednesday morning session the members formed in line, marched to the White House and paid their respects to President Roosevelt, special arrangements having been made for their reception.

OFFICERS ELECTED.

For 1902: *President,* Simon Newcomb; *1st Vice-President,* George E. Hale; *2d Vice-Presi-*