for titration in alcoholic solutions, and of the acid phthalates where aqueous solutions are to be used. In the discussion following the reading of this paper, Professor Coblentz spoke highly of tartaric acid and acid potassium tartrate as standards for titration in aqueous solutions.

On the Structure of Metals and Alloys; Aluminium Alloys: William Campbell.

Dr. Campbell, after describing the microstructure of the whole series of alloys of copper and aluminium, and the change in structure due to casting, dwelt at some length on the change which takes place in the solid state in alloys containing over 84 per cent. copper. It appears that the alloys solidify as solid solutions, and at a lower temperature rearrange themselves in a manner similar to that of the alloys of copper and tin between 68 and 75 per cent. copper, or of the carbon-iron alloys containing up to 1.8 per cent. carbon. Photographs of the alloys which had cooled slowly were contrasted with those of alloys which had been quenched from above the critical temperatures. On annealing the quenched specimens, the original structure was restored. The paper was illustrated by lantern slides.

The Determination of Molybdenum in Steel: F. V. D. Cruser.

Mr. Cruser described the analytical separation of molybdenum from iron and the rarer metals now added in making steel, such as chromium, tungsten, uranium and vanadium, and the various methods used for the determination of molybdenum. In the course of the work it was found that the separation of iron from molybdenum by caustic alkali was inaccurate, due to the formation of small but variable quantities of ferric molybdate which was soluble in alkali. A method was worked out which is believed to be entirely accurate; it is in brief as follows: Dissolve the steel in nitrosulphuric acid; separate the molybdenum as MoS_3 by hydrogen sulphide under pressure; dissolve the sulphide and convert to sulphate; reduce the molybdenum by zinc and reoxidize by a standard solution of permanganate. If tungsten is present the addition of three to four grams of tartaric acid prevents its contaminating the molybdenum sulphide. This method was tested on a number of steels and molybdenum alloys, and none of the metals present was found to interfere, while by the methods recently published the results were unreliable in many cases, especially when tungsten or vanadium was present.

On the Determination of Nitrogen in Food Materials and Physiological Products: H. C. Sherman. Read by title.

H. C. Sherman,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONVOCATION WEEK.

The multiplication of scientific and learned societies is the normal outcome of the enormous expansion in the fields of learning during the past few decades. The farther one pursues a single branch, say of science, the more he becomes separated from those following other branches of science. The scientific society represents, like all other societies, the grouping of those of similar tastes for mutual profit and entertainment. As soon as a society covers a field so large that many of the matters brought before it are uninteresting or unprofitable to any considerable number, the society breaks up, either into new societies or into sections, each with its own gatherings. This fact was recognized early in the history of the American Association.

But specialization can be carried too far. I do not mean merely that the man, mining so industriously at the bottom of his own shaft, is of little account to the rest of the world, indeed, often forgets that there is any world outside of his own hole. He himself may recognize that this is true and not care a whit, so that he discovers the truth for which he is searching. What is of far more importance is that in losing his sense of perspective he greatly hampers his own work. He needs to know what others are doing that he may gain a better conception of what he himself is doing.

We need the meetings of the special societies, and we need also the meetings of a general society, where men come in contact with

the workers in other fields than their own. The value of such gatherings is not so much in listening to papers or addresses, though these are often profitable, but in social intercourse, coming into contact with minds not cast in our own mold. It is particularly stimulating to younger men thus to meet with those who have already won their spurs, and is it not the duty as well as privilege of the latter to give this inspiration to their younger colleagues? The discovery of a man may be as important as the discovery of a theory.

How then shall such an ideal be brought to pass? We have such a society, covering the general field of science, the American Association; what should be its function and what the character of its meetings?

1. In its journal, for such we may call SCIENCE, it is actually accomplishing much to prevent narrowness in specialization. In an hour each week I get a glimpse of what is going on in the world of science. It seems to me that no specialist can afford not to at least glance through the carefully prepared papers on special branches, yet of general interest, the discussions and correspondence, the reviews of literature, the current notes on special sciences (would there were more of them!) and the general notes and news.

2. As regards meetings. Each society should have its regular annual meeting in the summer, for the presentation of papers, for excursions, for study or for whatever is of most value to the members as specialists. For many of the societies summer is the most favorable time for such purposes. These meetings should be held by each society without regard to the meetings of any other society, as to either date or place. In winter there should be a convocation week meeting of all the scientific societies, together with the American Association. At this meeting it seems to me that no papers of restricted interest should be read, but rather presidential addresses and lectures should be given, and sectional discussions (carefully prepared by a limited number of leaders) on topics of general sectional interest. No inconsiderable attention should be devoted to the social side of these annual meetings, but the time should be so apportioned daily that there should be no conflict; that is, a certain portion of each day should be set apart for each general purpose.

All this would necessitate points of adjustment between the sections of the American Association and the various societies. The functions of the sections and the societies are in many respects similar, and the question may well be asked, as it has been many times in the past, as to whether there is a place for both. Would it not be better for the association to become merely a federation of the scientific societies of the country? As it is at present, many members of the different societies attend the meetings and enjoy all the privileges of the association, except holding office and receiving the *Proceedings* of the association and SCIENCE, and contribute nothing to the treasury. Then there is always more or less friction in arranging the sectional programs where there is this dual control. In case of federation, with the council made up, perhaps exclusively, of representatives chosen by the societies, all this would be obviated. The chief difficulty would probably be arranging for the financial support of the federated association. Yet this would be by no means insuperable. It could be provided that each member of the societies should be charged the present dues of three dollars for the support of the federation, receiving therefor SCIENCE as now. Since the addresses would be printed in SCIENCE, the *Proceedings* could be discontinued, and a collective list of members printed in addition to the lists of members of each society now published. The reduced expense would in the end probably amount to as much as the income received from initiation fees, a source of income dependent upon growth in the association. Of course, such a plan would necessitate a certain amount of altruism on the part of the federated societies, but I can well believe a majority of the members of every society would be willing to sacrifice something for the general good of science, even outside of their own specialties.

Such a winter gathering should be held in a large and easily accessible center, in order to insure the largest possible attendance. Here

we meet the difficulty of the great distances separating workers in the various sections of this country. A satisfactory way of obviating this would be to hold a general meeting of the association only biennially, dividing the association geographically in the alternate years, with meetings simultaneously in perhaps half a dozen sections of the country.

Such changes as these suggested are radical, but changes have been going on in the administration of the association for the past decade, and it is evident other changes must come. Would not these meet the requirements?

Jas. Lewis Howe.
Washington and Lee University.

To the Editor of Science: The relation which the various scientific societies of the country bear to the American Association is one which demands careful consideration. First of all I think it may be assumed that the organization of all scientific societies should be of such a nature as to promote the welfare of the American Association. The latter body is the one organization of the United States in which all scientific men are brought together on a common level.

The necessity for special societies is, of course, recognized, but the greater necessity for a single society is equally as evident.

I should like to discuss, for a moment, some of the problems suggested in an article in Science, January 8, on convocation week, and especially with reference to the position occupied by the American Chemical Society. This society now has a membership of nearly twenty-five hundred and is rapidly growing. I have consulted the records of the attendance at the meetings of the American Association for the past few years and find that the members of the American Chemical Society represent about 30 per cent. of the whole attendance. During the whole of this period the American Chemical Society has held its meetings in conjunction with Section C of the association and the utmost harmony and good-will have prevailed. It appears to me, therefore, that the American Chemical Society has a more intimate union with the American Association for the Advancement of Science than any of the other affiliated societies. My idea is that each section of the association would be benefited by the adoption of this system of cooperation. It might even be made more intimate with great advantage. For instance, in the case of Section C the officers of the American Chemical Society might well be accepted as the officers of Section C, thus making Section C practically the American Chemical Society. It is evident at once that the aims and intentions of Section C and the American Chemical Society are the same, and by having the same set of officers there would be less trouble in arranging the program and dividing the time than there is at present. This, however, is only a suggestion, as I realize that the present form of collaboration is very satisfactory.

If all the other branches of science could be represented by powerful national societies the same collaboration could be established in almost all the sections. For instance, there is no reason why there should not be an American Botanical Society of approximately the same numerical strength as the American Chemical Society, and this is true of physics, geology, entomology and the other sciences. It might be well, however, to establish a limit of membership, so that before a subsociety should become intimately associated with the parent society it should have a membership entitling it to such a position. I should say that any national society representing a great science which has a thousand members could safely be admitted to the same affiliation as the Chemical Society now enjoys.

Unfortunately, I think, for the advancement of science, there is too great a tendency to organize separate and independent societies in each branch of investigation. This has been done already in regard to chemistry in this country in the establishment of two very powerful societies entirely distinct from and without any affiliation whatever with the American Chemical Society. I refer to the American Electro-chemical Society and the American section of the Society of Chemical Industry. I do not wish to speak in a reproachful way of these two organizations, because I am a member of both and fully appreciate the great work that each is doing, but it

seems to me that this work might be even more effective if conducted in conjunction with the American Chemical Society.

The same tendency to disintegrate seems to pervade the other sciences. For instance, I note that at the St. Louis meeting there were represented in the American Association the American Society of Naturalists and the American Society of Zoologists. Now, of course, I do not know just what kind of a science naturalism is, but I suppose a part of its work is zoology. I also notice that there were represented the Association of Economic Entomologists and the Entomological Club of the Association, the Association of Plant Breeders, the Botanical Club of the Association, the Botanical Society of America, the Central Botanists' Association, the Wild Flower Preservation Society of America and the Fern Chapter. Again I am at a loss to know exactly what a fern chapter is, but I assume that it has something to do with botany. I also note the presence of some societies which can hardly be associated with any one science, for instance, the 'Sigma Xi Honorary Scientific Society,' the Society for Horticultural Science and the Society for the Promotion of Agricultural Science. Would it not be better for all parties concerned if all these botanical clubs and societies were sections of one great national society? It seems to me, therefore, that the sections of the association devoted to physics could thus become affiliated or become really the American Physical Society, the geological bodies become the American Geological Society, zoologists become the American Zoological Society, the entomologists the American Entomological Society, and all the botanical clubs be united in the American Botanical Society. The presidents of these societies, respectively, would become the presidents of the sections of the association. This would in no way interfere with the autonomy of the national scientific societies, but would unite them all under a common head, namely, the American Association for the Advancement of Science. It would also permit the great national societies to divide up into sections to study special subjects. Separate sections of the American Association could be formed for scientific discussion of general subjects such as economics, medicine, etc. It would, indeed, be excellent if the American Medical Society would become affiliated in a similar way with the association. If all this could be accomplished, instead of having four thousand members of the American Association, we would have four times that number. The moral effect of such a union would be great and its economical effect still greater.

There may be many objections to such a form of affiliation, but judging from experience in connection with the American Chemical Society and its relation to the American Association, I should say that these objections are not fatal. H. W. WILEY.

TO THE EDITOR OF SCIENCE: A response to your inquiry, if a faithful reflection of my convictions, may serve only to range me with a conservative minority on this matter of scientific organization and expose me to the raking fire of the progressists.

I confess to a feeling of apprehension at the insistent and impetuous efforts which are making toward the centralization of scientific endeavor in the United States and the creation of a formidable scientific machine in which individuality is to be reduced to a cog. Scientific organization on a grand scale is claimed in your recent vigorous brief on its behalf, to be important, not for the good of the scientific man, but for that of science, in which particular the science union or science syndicate will differ from the actual genius in the combinations of labor or capital. These are organized emphatically for the benefit of the individuals who are in, not for any such vague objective as the good of labor or the idealizing of business. The ideal man of science may be so supramundane that he can afford to give allegiance to such an altruistic purpose as the enthronement of science regardless of his own interests, but the actual scientific investigator, no whit below the ideal in his ardor, wants to do the work, as much of it as his powers and his years permit, to achieve all within the range of his opportunities; and he also has a just pride in and right

to the honors that he earns and the credit that he wins. If he is laureled by some exclusive society of select spirits wherein the seating capacity is small, some ancient, time-honored fraternity whose notice is recognition of his successful achievement, let him wear his honors. They are well won and were well worth striving for, unless the world is to be made over. But laurels on the wheels of a great machine will be very much in the way.

This central agent of science will, you venture to hope, obliterate all individual rivalry for precedence, all controversy directed to enforce or maintain the individual view or interpretation, and differences of opinion are, I infer, to be adjusted by conference and arbitration; but I hold it the very essence of scientific vigor that the investigator maintain his conclusions against all comers. In keen, well-behaved controversy, more than in conference, in determined and relentless adherence to conviction, rather than in meek surrender to 'the good of the party,' the real vitality of scientific labor reveals itself. If any laborer in your own field of research is weak, faulty in his method, careless of fact and indifferent in deduction, it is somebody's duty to tell him so or the truth may remain concealed, and, I take it, it is the truth we are after and not merely the 'advancement of science.' But a science machine that will do away with all this, throws laurels in the waste basket and calls every one mister, stops the mouths of lions, pools all individuality and makes us all sucking doves and a spectacle for angels, may seem a beneficent institution, for now that all American men of science have been reduced to mere algebraic expressions, tagged and filed, there would be nothing for them but to take their numbers, get their union cards and try to live up to the motto, 'Better to be the tail of a mouse than the head of a lion.'

After perusing your article with care I am disposed to apprehend that centralization of science means the creation of a juggernaut which will crush endeavor, stupefy ambition, incinerate stimulus, minify personal achievement and cachinnate at honor—the sweet recompense which comes from a life of earnest labor.

John M. Clarke.

January 12, 1904.

To the Editor of Science: I thank you for your invitation to join in discussing the question how best to organize into one cooperative fraternity all our national scientific societies.

I would have the members of the council of the American Association feel that the entire burden of this holy mission rests on their shoulders; that as success would be their crown, its failure would be their undoing; if need be the martyr spirit is to be dominant, and whosoever would be chief, let him be the servant of all.

Say to them, always seek to draw and not to drive, to encourage and not to discourage; to suggest cleverly and not seem to direct; to attract and not to coax or bully. The old saying, Where the carcass is there will the eagles be gathered together, will prove true in their case as in every other. Remember what Jean Paul told us long ago, Not all are always reasonable, but all have feeling—never forget that in addressing them.

I would have the council in this matter generous to a fault. A distinguished botanist living 3,000 years ago or such a matter, who knew the plants of his country from the lichens to the conifers, must have been thinking of our association council when he wrote: 'There is that scattereth and yet increaseth and there is that withholdeth more than is meet and it tendeth to poverty.'

Try to improve your volume of *Proceedings*. It is not altogether hopeless, though you shake your heads. Remember Hercules. Moreover, dear friends, the weekly journal chosen to be the Aaron of our scientific Moses ought to be dignified, true to the truth always, but at the same time moderate in utterance. Surely, surely, no council planning to do missionary work can make friends at the outset by denouncing through its official organ three highly honored institutions of science as having completely failed.

'Let dogs delight,' etc.

Take especial pains to have at the annual gatherings and mass meetings men of distinction, of whom all have heard and whom they desire to see. I recall the long-ago delight with which my young eyes first gazed on E. B. Tylor, and when as a student I held in my

grasp the hand of Lewis H. Morgan. If such men only knew how good the sight of them is to young and longing eyes, they would make sacrifices to give so much pleasure.

Encourage specialization. The closest affiliation of specialists and aggregation into a mutually helpful cooperation are necessary to the intension of a science. It can not be too compact or too lively. The moment they organize the institutional mind is born.

But to the special societies let me say that the beau ideal of learning is to know all about some and some about all. In your meetings the infimæ species of details, instruments and processes are scrutinized and discussed; but in your family gatherings all learn the results of the tedious labors of each. You acquire the ability to read or listen intelligently. Let me illustrate great things by small: There is an old man in one of the dependencies of the Smithsonian who was engaged to write up the textile arts of the American aborigines. Through its many agencies he was furnished with overwhelming material from the whole area between Point Barrow and Magellan Strait; between Nova Scotia and Attu Island. If he had possessed seven league boots, a canoe that shot past the wild geese, the hundred eyes of Argus Panoptes, the hands of Briareus and the longevity of Methusaleh it would have surpassed his powers to bring together so much. But no sooner had he sat down among the stuff than he discovered his lack of omniscience, a quality required of him before taking the first step in so comprehensive an industry. He must know chemistry for dyestuffs, geology for horizons, geography and meteorology for environments, botany thoroughly for plants, zoology for staples and implements, ethnology for peoples, philology for names, not to neglect mythology and folklore for the charming symbolism.

I will not worry you with the long list of the Covilles, Merriams, Holmeses, Houghs, Chesnuts, Willoughbys, Boases, Dorseys, Mooneys and more; nor of the many bureaus and branches of the government that gladly put themselves at his disposal; nor of the leading museums, Peabody, American, Field-Columbian, Golden Gate Park, with the rest, whose treasures illustrate his pages. The thing that bothers him now is what name to put on the title page.

The lesson I would learn from this parable is that the highest possible specialization only makes the closest solidarity that much more necessary. The council has my blessing and best wishes and shall have my cooperation in its endeavor. O. T. MASON.

January 19, 1904.

SOIL WORK IN THE UNITED STATES.

IN the *Beet Sugar Gazette,* published on December 5, 1903, on page 419 is given an account of the trip of the Secretary of Agriculture through the beet sugar region of Michigan. At Rochester the Secretary made an address in which are found the following words:

"When I went to Washington I found that we had no knowledge of the soils and I went to work and organized a bureau of soils and have over two hundred scientists engaged in this work. I shall send a corps of soil physicists next year to every sugar factory in Michigan to examine the soils, and the information which the Department of Agriculture obtains is at your disposal."

In many other public addresses the Secretary of Agriculture has given expression to similar sentiments, and especially has he criticized the colleges and universities of the United States, because, as alleged, they fail to train their students in such a way as to make them valuable to the Department of Agriculture.

We all know that the Secretary of Agriculture means well and does the best he can for the interests over which he presides. Under his energetic administration, the activity of the Department of Agriculture has been materially increased, and its usefulness greatly enhanced. He does not pretend to be a scientific expert, and we must presume that his ideas on scientific work are mainly the result of the environment in which he lives. It, therefore, becomes an interesting question whence has come to him the information that the agricultural colleges fail to train students usefully in agriculture; that the uni-