

illustrating the practical methods of using thermit in welding electric car rails in place, repairing broken stern posts and shafts in large steamers, etc.

ARTHUR M. COMEY,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONVOCATION WEEK.

IN the multitude of counselors there is said to be safety, and it may be hoped that a sound conclusion may be evolved from the widely differing views which are finding expression in the columns of *SCIENCE*.

In my own opinion, as in the opinion of some others who have already written, it has been a mistake to change the time of the meeting of the American Association from summer to winter. The American Association is and should be a popular association. It seeks to include in its membership not alone professional workers in science, but the wider public who have a more or less intelligent interest in the results of science. It appeals not only to the professors in the universities and colleges, but also to the great army of teachers in the secondary schools. It draws its members not from one district, but from all parts of the continent. Now I think that the time for the meeting of such an association is the summer vacation. In our winter, long journeys are apt to be more or less uncomfortable, and trains are not infrequently seriously delayed by snow. It is impracticable for the colleges and schools to arrange their work so as to allow a long vacation at Christmas time; and part of the Christmas vacation is and ought to be devoted by most of the students of science in the country to the claims of home and family. Both the inclemency of the weather and the shortness of the time at our disposal render it impossible to have excursions in connection with a Christmas meeting; and, in the American Association, as in its illustrious prototype, the British Association, the excursions are a very valuable part of the privileges offered by the meeting. Any one who has attended a meeting of the British Association in recent years, studied the elaborate guide-book for the locality prepared by the

local committee, and availed himself of the opportunities of excursions adapted to his own tastes and studies, whether he be a geologist or a naturalist or an archeologist or an engineer, will appreciate how valuable this part of the work of such an association may be made. These excursions are valuable alike to the professional scientist and to the amateur.

While the Christmas vacation seems to me a very unsuitable time for the meetings of the American Association, it is an excellent time for the meetings of the numerous associations of more restricted membership and more definite scope. In several cases these narrow professional societies have already divided themselves into sections distributed in different regions of the country. The members of a local section of such a society can easily get together in the Christmas vacation. The journeys required are comparatively short, and the time at their disposal is amply sufficient. Their program does not aim to cover all science; they are not required to do anything in the way of popularization; they can meet for a few days of quiet, earnest work in the discussion of the papers of a homogeneous program; they can find relief from the serious work of the sessions in a dinner or a smoker or both; and, when they have done their scientific work, and enjoyed their friendly greetings and renewal of cherished associations, they can go home in season for the opening of the winter term in the institutions with which they are connected.

It was said by many that the large attendance and the great interest in the Washington meeting were the vindication of the plan of a winter session of the American Association. It must be remembered, however, that Washington is altogether an exceptional city. In the number of resident scientific men, and in the variety of museums and other indoor attractions for students of science, professional or amateur, Washington stands unrivaled. The success of the Washington meeting was due to the exceptional character of the locality. The comparative failure of the St. Louis meeting affords more nearly a just criterion of the expediency of the plan.

I believe, therefore, that the right plan is to put back the meeting of the American Association to its old place near the close of the summer vacation, and to leave convocation week for the smaller, more homogeneous, and less popular associations of working scientists.

WILLIAM NORTH RICE.

NATURAL SELECTION IN KINETIC EVOLUTION.*

THAT there are species, varieties, mutations or hybrids which differ in one, two, or three characters, as commonly assumed in discussions of Mendel's laws, is a misleading assumption. To speak of a species as having developed in one direction or as having a single peculiar character may be permissible for taxonomic purposes, but in evolutionary studies it is careless to forget that the diversity is general, if not complete. The diversity of varieties and species is like that of individuals, but greater. Evolution, which is a continuous summary or integration of this individual diversity, is not a simple process, but highly multiplex; as much so, indeed, as the lines of descent in which the life of the species goes forward. A composite general direction is maintained by the species because the multitudinous strands of individual descent are bound together by interbreeding. The variations take place in particular threads, but evolution signifies rather the progressive change of the whole organic network.†

The evolution of a new type means changes in many directions and of many kinds, in the germ cells and in the various tissues and organs, as well as in the external form of the complex cell-colony which we are accustomed to look upon as a single individual. Each cell, tissue, organ and feature is undergoing evolution, and for normal and permanent progress these manifold developments must keep together. When single lines or slender strands of descent are separated from the main network the congruence of type is lost. The normal variation and individual diversity

* Read before the Biological Society of Washington, March 19, 1904.

† *The Popular Science Monthly*, March, 1904, p. 451.

of the species having been eliminated, the evolutionary coordination of cells, organs and functions breaks down, and abrupt changes or aberrations of heredity appear. These degenerative mutations may not differ in their essential nature from normal variations, but the conditions of their appearance are abnormal, and the results often disastrous.*

A domestic variety may be 'improved' by the further increase of the one or two characters or qualities which render it valuable, but a new specific or generic type is the compound or resultant of many variations in many characters. By close selection which restricts evolutionary progress to a narrow line of descent a 'single character' may push out farther in a decade than the natural multiplex evolution would carry it in a century or a millennium, but such a specialization weakens and unbalances the organism, and is a process of degeneration rather than a constructive evolution. Selective inbreeding and other forms of isolation accentuate single characters, but the interbreeding of normally diverse individuals (sympathy) weaves new types out of the variations of many lines of descent.

The neglect of this distinction vitiates much evolutionary literature, both that which treats selection as an actuating 'force,' and that which rejects selection for 'discontinuous variation' or 'the mutation theory.'† It is

* Mutations, like hybrids, are sometimes completely sterile, and they may have at the same time an increased vegetative vigor. The vegetative vigor of many mutative varieties of domesticated plants has doubtless delayed the recognition of their abnormal evolutionary status, though the abnormality of infertile hybrids has long been appreciated. It is paradoxical, indeed, that the increased vigor which accompanies normal variations and crosses should also attend degenerative changes, but there is room for this apparent contradiction in so complex and many-sided a process as evolution.

† Very recent examples of the latter tendency are found in Professor Morgan's 'Evolution and Adaptation' and also in Dr. D. T. MacDougal's review of this work (*Torrey*, 3: 185, December, 1903). Professor Morgan refers (p. 368) with approval to an admission by Darwin that selection can not explain dimorphism in plants be-