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FIELD-CLUBS AND LOCAL SOCIETIES.

WITHIN the last twenty years there have been a good many experiments made in this country towards the development of science in districts where access to public instruction, in the way of lectures and large museums, was not to be had. Some of these efforts have been successful, but many of them have failed, principally from a want of understanding of the conditions that make success possible. There are few country towns, in this or any other land, where it is possible to maintain an academy patterned on the great societies. Such institutions can only do good when they are sure of the support of many earnest workers, — of men to whom science is a matter of all-absorbing interest. Very few *societies* can be maintained without a system of publication which is very costly, and often of no measure of utility compared with their expense.

To make a society successful there must be a distinct object for it to attain, — one which is well within the reach of such efforts as its members can bestow upon it. The success must be of a tangible sort, — one that is constantly and readily attainable, and in which many can take an active part. In the great societies of the world, this end is honor, or at least notoriety, that may simulate the nobler motive. In a village, a town, or even a provincial capital, neither of these ends can be had with sufficient certainty to secure the talent that is open to temptation. So the local society languishes, or, doing better by itself, dies out altogether.

There is another form of associated action among the lovers of science that escapes the dangers of the more pretentious associations which take the name of society or academy. This is found in the field-club or purely local society, which proposes for itself the study of the problems that lie at the very thresholds of its people. Such associations have already proved wonderfully successful in the old world. They abound in England, and are numerous on the continent. They have found a place in the affections of the people, and a certainty of continued life, where academies have dwindled away.

We do not have to look far into human nature to see why this success has been gained. It is happily natural for men to take more interest in near than in remote things. The primrose by the 'rivulet's brim,' provided it is one's own rivulet, is more interesting than the Victoria regia of far-off wildernesses. The geology of the township where a man lives is more interesting than that of the Colorado cañon, which has never concerned him. So it is that any association for the study of near things has a certainty of support that cannot be secured for any general work in science; and field-clubs which try to promote the study of a township, or at most of a county, are likely to find a support that surprises their founders.

Then, if the proper method be followed by these clubs, there enters into their life an element of the holiday which is very far from the senatorial methods of the more dignified society. Their meetings should be principally in the outer air; for they thus secure the best that the study of nature can give, something of the freshness of woods and field, and the cheerful contact with other fellow-mortals beneath the open sky, — a relation that has a charm that is denied within four walls.

Wherever there is a single zealous student

of nature, there is the germ of such an association. He or she can easily gather together a dozen of boys and girls, men and women, who will find in open-air inquiry a rich reward for all the time and force that such activity demands. There should be as little of the machinery of a society as the circumstances will admit: a council of three to five persons to direct the scheme of studies, and a secretary, will serve all the first needs of the association. A few winter-time meetings will find an interest in the discussion of the problems that the neighborhood affords, in the review of work that has been done, and of work there is to do; but the most of the work should be done in the field-meetings.

When there are enough engaged in the work to warrant it, it will perhaps be well to have particular inquiries placed in special hands. Each field-meeting should be for some particular end or ends; and, after the field-work is done, the members should be gathered together, still by preference in the open air, for a discussion of the results obtained.

In those cases where the circumstances admit, it is well for such a society to begin the making of a little museum devoted to the illustration of the field with which they have to deal. The cost of such a collection need not be great; and the utility of the work is very great, provided it be not too much of a burthen to the association. It would best not be undertaken unless the club can see its way to a well-assured income of at least five hundred dollars per annum, beyond the rent of a room where it is deposited. Generally it will be possible in towns of any size, and where public spirit reigns, permanently to secure a room in some schoolhouse or library building, large enough for the needs of the little museum. The walls of a room twenty by thirty will serve for the storage of specimens for many years, and its floor-space will be great enough for meetings in the winter months.

The first thing to be secured is as good a map as can be obtained, on a tolerably large scale, of the region to be studied; for the awakening of the geographical sense of the members is one of the best results that can be obtained by a field-club. In proper time this map can become the place of record of a great deal of fact which cannot be represented by the specimens that may be gathered from the field that it represents.

The five hundred dollars' revenue upon which such a collection should always rest will serve, with due economy, to provide shelves for the collections, to meet the cost of alcohol, bottles, etc., and pay the trifling other charges of the society.

While it is best that the work of such a society should be thoroughly autonomous, — that the motive for its prosecution should come from the people themselves, — it will at times be well to secure the aid of some one specially trained in such problems as its field affords, in the way of suggestions concerning work to be done. Many naturalists will be glad to give aid in this way, either by a lecture, or by written advice. Every field affords problems in geology, botany, entomology, etc., the solution of which is within the limits of the simplest research if it only be patient and truth-seeking in spirit. More of the future of natural history lies in the prosecution of such inquiries than in all the work that can be done in the closet.

Such collections, as soon as they are begun, will at once command the attention of working naturalists. They are sure to be visited and studied; and this interest they arouse will, in itself, pave the way to a quickened life, and better inquiry on the part of the members of the club.

When these societies become numerous enough, — when there are a dozen working in New England, for instance, — it will be well to have a little joint action among them, such as could be obtained by an annual meeting of representatives from them, for the discussion of methods and of problems to be jointly investigated. The interesting experiment of a state meteorological system in Missouri has shown how useful local observers can be in this science. It might be well for the societies to

arrange for some common system of observation in this branch. So with each of the sciences: conjoint action would solve many problems that are of the highest interest.

Then, again, there would be a great influence on the extension of science-teaching in the public schools, that would certainly come from the existence of such local societies. The greatest danger that now menaces natural science is, that the parrot system of teaching, so long applied to other branches of learning, will be taken in science-teaching. The presence of a little band of actual inquirers in any town will be the best possible assurance against this. Let the children have some share in the open-air actual study, and the evil of the book-system will surely be mended in part; for its imperfections will be seen.

It will often be possible to organize such a club in immediate connection with the schools of the town where it started. Experience in Europe shows that children readily and zealously engage in such inquiries, and need only a little direction in their work.

However we look at it, we see much to hope from the extension of the field-club system of science study.

THE NATIONAL RAILWAY EXPOSITION.

I.

THE exhibition of railway appliances now being held at Chicago is probably the most complete collection of all the varied apparatus used in every department of railroad working and construction that the world has ever seen; and the management are to be congratulated, that, while little has been omitted to make the show complete, still less has been included which is foreign to the subject of railroads. The exhibits range over a wide field, from uniform-coats to steel rails, railroad officers' desks to revolving snow-ploughs, and from an electric railroad in full working, and earning quite handsome traffic receipts, to George Stephenson's first locomotive, which is shown by an English railway company.

The main questions which are now awaiting solution in the railway world are well represented in the exposition. The cheap transport of heavy freight-trains over steep grades, the conveyance of perishable articles, such as meat and fruit, and the control of the *vis viva* or momentum of trains, are all questions which have to a certain extent been solved; and further developments of these solutions are shown. A locomotive of unprecedented size and power, fitted with a valve-gear of novel construction, which yields excellent results, is shown by the Southern Pacific railroad, and a large number of fine engines are shown by the Brooks and other locomotive works. The exhibition of refrigerator cars is very complete, and most of them appear to be of simple and efficient design. Continuous brakes, applicable to freight-trains, are exhibited; and as some of them appear worthy of careful examination, we shall refer to them later on.

While there can be no doubt, that as regards cheapness and rapidity of construction, general excellence of bridges, locomotives, and cars, the railways of this country are ahead of the rest of the world, the signalling arrangements here, with few exceptions, are rudimentary and inefficient, and render fast travelling a matter of considerable difficulty, if not danger. It is impossible to run a really fast express-train if the signals are ambiguous, and if every level crossing is made a compulsory stopping-place. The saving in time by fast trains can only be fully felt in a great country, where very long journeys are not only possible, but are frequently undertaken; but hitherto this fact has been little appreciated, and people have been content to travel at a slow speed, and put up with frequent stoppages, because the railways were new, the rails roughly laid, and many bridges unsafe at a high speed. But of late years these conditions have been materially changed. The wide-spread use of steel rails, the greater care bestowed on the road-bed, and the introduction of iron bridges of first-class workmanship, have rendered high speed perfectly safe and easy on most parts of good roads in the eastern and middle states; but it is rendered unsafe where switches are so arranged that they may be left open to an approaching train without any signal warning the engineer, or the signals are so formed that the difference to the eye between a clear or all-right signal and a danger or stop signal is slight in snowy weather or under certain atmospheric conditions which render the difference between colors imperceptible, though a difference in form may be perceived.

The exposition is, however, especially strong in signal apparatus; and there can be little doubt that the most important result of the exhibition will be the wide-spread adoption