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LOCAL SCIENTIFIC SOCIETIES AND THE COMMUNITY[1]

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THROUGH the whole range of nature, classification shows an underlying simplicity of principle expressed through various materials and in diverse grades. Gravitation controls galaxies and sand-grains, and evolution is the common destiny of genera and of individuals. Both of these fundamental principles tend inevitably to pile up aggregates of ever-increasing size and complexity. But such aggregates are collections of units, and, while appearing to acquire new properties, remain subject to the laws that govern units and dependent on the reaction of their components to those laws.

Human nature, despite the bombastic claims often urged by its exponents, illustrates the operation of the principle of evolution with painful fidelity, especially in its social reactions. From the lone hunter through the clan to the totalitarian state the process of aggregation goes on, with increasing complexity and decreasing flexibility, until Nemesis clears the stage for the next performance. Within the frame of natural or imperial unification are innumerable smaller aggregates, each so similar in type to the whole that one is reminded of a crystalline fabric, where each molecule has a shape consistent with that of the complete crystal.

A scientific society is but one example of this tendency towards congregation of kindred types. Whatever may be its peculiarities, its success or failure, each society has originated in much the same way as all the others. In most cases, its history can be traced back to the enthusiasm of an individual, who has attracted

[1] Address of the president of the Conference of Delegates of Corresponding Societies at the British Association for the Advancement of Science, Dundee, 1939.

and stimulated a small coterie of friends or disciples. Organization has followed; and, whether it was invented or adapted from previous models, it has produced a miniature copy of a democratic state, complete with cabinet and treasury.

The aims of these societies vary somewhat, some being devoted to research, others to instruction. The former type of society is in constant danger of decline, for it needs continuous stimulation by new enthusiasts in successive generations; the latter is fortunate if it avoids the comatose senility of a social club.

Sociability is, however, the key to the success, and almost a *raison d'être,* of a local society. Unless this is an association of friends, it belies its name and loses its efficiency. It is not in the academic eminence of its members, but in the spirit of cooperation and enjoyment, that the value of the society lies. For this reason a society that organizes field-excursions as an essential part of its program is a far more lively institution than one where the members meet only in the enforced silence of a lecture-hall. The element of friendly intercourse may, naturally, degenerate into a mere picnic; but even that is preferable to the priggish snobbery of a lion-hunt.

A society attracts to membership others besides those whose natural enthusiasm marks them as leaders in its enterprise. Although the danger of over-emphasis of the social side may be thus increased, such recruits are to be welcomed. Some may become interested and inspired, but all will contribute something, be it only a subscription, to help the society's work. No government can hope to carry out its schemes without the backing of a body of reasonably willing tax-payers.

The present is not altogether a propitious period for the advance of local societies. Although the proportion of the population capable of appreciating the aims of the societies is perhaps greater than formerly, the increase in the opportunities for recreation tends to reduce the personnel for any particular form of activity. Its local character is an essential aspect of a local society, and the metropolization of the provinces by transport and wireless telephony has obliterated much of the individuality of districts. Most societies deplore the lack of youthful recruits, and look forward with anxiety to decreasing membership.

In the great majority of cases, the members of local scientific societies are "amateurs" in the generally accepted sense of that term. Their scientific work is their hobby; and in the present pressure of business life few have time or energy to spare for a pastime that demands intellectual effort. The young prefer forms of recreation that involve strenuous and often exhausting physical exercise, while the middle-aged tend towards somnolent recreation. Not until retirement ensures leisure for following their own devices can most business men undertake the responsibilities or even enjoy the privileges of active membership. To such, a scientific society may offer hope of survival and of congenial activity, beyond the critical phase at which it used to be customary to receive an inscribed clock to mark the last few hours of life. Local societies can confer benefit on these and on themselves by attracting them to membership. Individually they may have poor actuarial prospects of permanence; but as a class they are available in ever-increasing numbers.

Probably the most fatal disease that can overtake a local society is that which gives it a reputation for erudition. If there is any truth in the fear of a prospective member that he or she would feel ignorant in a company of savants, membership should be avoided at all costs, for the society is not worth joining. Interest, not intellectual, should be the gauge of suitability; humble inquiry is more appropriate even to the specialist than declamation of a learning that is only ignorance in disguise. Mutual sympathy and encouragement must be the spirit of the society; all are there to learn, and no teacher needs to be reminded that he learns at least as much from contact with keen students as they are likely to learn from him.

So much of the useful work and maintenance of interest in scientific matters depends on casual everyday observation, that aspects of nature ready to hand for the majority of members are likely to receive and give most satisfaction. A society in a coastal town can obviously foster the study of marine conditions that would be outside the practical scope of one in a midland industrial city. While retaining an intelligent curiosity in respect of any and every thing in the universe, a healthy local scientific society will normally tend to focus its main efforts on locally appropriate topics. In this matter, the term "locally" may apply to some especially vigorous member, whose enthusiasm for his particular bent infects many of his colleagues, and, for his generation at least, overshadows the milder activities of those who have escaped contagion. Such waves of fashion are perhaps inevitable; but they are not altogether desirable. Hero worship falls very flat when the hero proves mortal.

Most local societies are devoted to "natural history"; very few take much cognizance of the physical sciences. When specialization is made, the two subjects of geology and archeology are those usually selected. Evidently the main function of a local society is its provision of relaxation for people who have no technical training in science. Outdoor interests offer far healthier spare-time hobbies than laboratory studies where elaborate calculations or stiff reading give no respite to jaded minds. An attractive feature of the natural sciences is the scope they afford for the making of collections. From early childhood the jackdaw-complex is deeply ingrained in most of us; and although specimen-collecting may become a vice, it shares that

risk with all other virtues. So long as mere miserly acquisitiveness is avoided, the arrangement and study of collected material can revive memories of past thrills and prolong the joys of field-work. This matter of collections is so important that it may be discussed somewhat fully.

An important duty of every scientific society should be the control, by precept and example, of the mania for collecting. Especially in the case of living things, due regard for the preservation of rarities must check wholesale destruction. It is pleasing to be able to record a great improvement in this respect achieved in recent years, largely through the influence of local societies. The days when a rare plant or animal was ruthlessly slaughtered in the name of science are past—even game-keepers (who are rarely members of our societies) are less promiscuous in their attacks on any creatures worth preserving. We are even beginning, with the inspiration of the Council for the Preservation of Rural England and the National Trust, to frown upon, rather than to condone, vandalism done in the sacred name of Mammon.

But there yet remains ample scope for the training of collectors; and almost every society is likely to include some members who can guide and counsel the uninitiated. Collection involves dissociation of the specimen from its natural environment; in the majority of cases that environment is one of the most informative features of the specimen. It can not be brought away in substance, but it should always be recorded in writing with all possible detail. Paradoxical though it sounds, it is nevertheless true that a collection of specimens without adequate labels is less useful than a collection of labels without specimens. Every particular of the circumstances attending the collection of the specimen should be written down at the actual time and place—memories get blurred at the end of a day. Even details that seem irrelevant should be noted; wider experience may show that just such points had the greatest significance.

If all the material that clutters up our museums had been collected in accordance with that simple principle, its value for scientific research would have been enhanced a thousandfold; the charnel-house would have been a biographical library. One battered fragment with a history is worth a score of "plums" without a label; for there is more satisfaction in scientific circles over one poor specimen with particulars attached than over ninety-and-nine perfect examples that have no such accompaniment.

In the matter of collecting, the local society has no need to encourage an inborn instinct, but rather should guide and restrain. A collection made for a definite intellectual purpose is unlikely to lead to decimation of its materials. But the collecting of specimens is really a pandering to low instincts; a far more important and fruitful activity is the collecting of facts. Except when they are needed to substantiate a record or are required for intensive research, objects observed are often better left where they are. This policy of restraint does not apply to inanimate objects, which may be preserved by being taken under cover; but in the case of living things it is unusual, and surely unnecessary, to prove that one has met a friend by bringing his corpse home as a witness.

In the matter of research, the greatest contribution (other than encouragement) that can be made by scientific societies comes from their ability to keep, check and publish records of transient phenomena. Every recurrent seasonal event in nature invites, and often receives, accurate observation. Whether it be the first cuckoo or the last swallow, the flowering of the primrose or the ripening of the holly, it is apt for and deserves a permanent record. In such work the society, as distinct from the individual, has a special value; for records without independent confirmation are of uncertain use. Moreover, a record, however well authenticated, of a single phenomenon gains immeasurably in importance when taken in conjunction with other records of contemporary events. The dates of appearance and disappearance of living creatures are shorn of half their significance without statistics of the weather for the season. The arrival of a migratory bird in any district may prove to be controlled by the appearance of a particular insect, and this again may depend on the growth of the insect's food-plant, which may have been determined by the weather-conditions of the current or past season. The keeping of statistics thus becomes a matter of team-work; ideally every natural history society should include observers who keep accurate and unbroken records of data on every conceivable topic capable of such treatment.

Accurate prophecy is always based on knowledge of past history correlated with a perception of the laws of cause and effect. Statistical records such as those indicated would provide the raw material of prophecy; if such truly natural history of but a few decades were available, it would aid in forecasting just those tantalizing mysteries that every farmer, and so every consumer, wants to know. Just as a straw shows the way of the wind, so some obscure animal or plant might, if its significance were realized, provide an answer to problems of immense practical importance. The most sophisticated social order depends ultimately on nature, and common sense demands that the foundation of the social fabric should be studied. There is endless useful research awaiting the efforts of local observers in this indirect aspect of man's place in nature.

As regards geological and archeological studies, there can surely have been no period in the past more favorable than that in which we find ourselves to-day.

For one reason or another, excavation is a dominant feature of our present activities; and, however shallow it may be, every hole is likely to reveal something of interest. Modern methods of excavation are so speedy and mechanized that much of their revelations can be observed only by perpetual watching. Here the local society can find scope for important and urgent work. Every society should acquire a large-scale map of its area, and plot on it every site where a glimpse, however fleeting, of the subsoil has been possible. Pin-pricks on the map, with numbers written against them, to correspond with card-index entries giving all the particulars, would soon make the map a priceless record. Only accuracy and persistence are wanted to achieve results that could not fail to increase the knowledge that all local societies are nominally out to acquire. Probably most societies include one or more members with the business experience needed to keep the records in order, and every member could contribute to them directly or indirectly. The volume of local knowledge already stored in the minds of residents is impressive; if that knowledge were to be methodically recorded, it would outlive its original possessors and so contribute to something more permanently satisfying than reminiscent causeries.

The suggestions for activity outlined above may seem to be more concerned with the relation of scientific societies to science than with their reaction on the community at large. Such a view is not only narrow, but out of date. In the present critical times, statistics of the resources and character of the country are being feverishly compiled. There could surely be no better compilers than those residents in any district who have trained themselves to observe facts and to tabulate them methodically. Such problems as the yield of springs and wells, the availability of road-metal, sand and gravel, the quality of the soil, the incidence of blight and the usefulness or otherwise of our fellow inhabitants, are all of a nature that demand accurate observation on the spot. Many of them may involve elaborate technical study as well; but the first stage of all of them is within the capacity of any reliable observer. All who love their country (in both senses of the word) can find here congenial and valuable work that is needed urgently.

The proportion of the population likely to join, and participate in, a scientific society is inevitably small; but that is no reason why it should not serve as a leaven. The study of natural history produces a philosophic outlook that should supply a much-needed corrective to the world, and can mitigate the worst attacks of the flesh and the devil. The mere existence of a company of people declaring their interest in matters bigger than the squabbles of the political nursery, preferring to contemplate wider problems and vistas than those of the daily headline, should be enough to ensure a nucleus of stability in the quicksands of opportunism. Science is a search after the truth; its devotees should be sure of their gospel, and declare it in a world of falsehoods: *Magna est veritas, et prevalebit.*

WHERE DO METEORITES COME FROM?[1]

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SINCE the days of Schiaparelli and H. A. Newton, astronomers have considered three possible answers to the oft-repeated question, "Where do meteorites come from?" The three answers considered are: (1) that they come from the distances of the fixed stars; (2) that they come from the outer portions of the solar system, like most comets; and (3), that, like the closer asteroids, they have been traveling in orbits little larger than that of Mars.

Schiaparelli and others were impressed with the fact that the great majority of velocities as determined for the meteors dropping meteorites were high. They were so high that, if real, the meteors must have come from the distances of the stars. H. A. Newton, however, found that most meteors dropping meteorites came from the general direction of the anti-apex of the earth's motion. That is, before the meteors entered the earth's gravitational field, they had been traveling in the same general direction as the earth itself. This indicated that the meteors had been traveling in orbits little larger than the orbit of the earth, so Newton and others suspected that the high velocities found for bright meteors were fictitious.

When meteor work was instituted at Iowa some twelve years ago, it appeared that greater accuracy in the paths and velocities for spectacular detonating meteors was needed. To attain this greater accuracy, measurements of the angles and durations have been secured by personal interviews. The observer is asked to stand exactly where he was when the meteor was seen, and the angles are measured as he points them out. If there was definite action at the time of the fall of the meteor, he is asked to "reenact the scene," and the duration is determined with a stop-watch.

[1] Condensed from a paper presented before the American Astronomical Society at Berkeley, California, August 9, 1939.