corporation, while Peruvian planters obtain the most valuable fertilizer at a price which our American farmers would consider astonishingly low.

Now, in the words of Captain Cuttle, "The bearings of this observation lays in the application on it."

In the first place, one of the essential principles upon which this scheme of protection is founded is that of closure of breeding grounds in rotation *for periods of years.* This principle must be distinguished from the common measures of protection through closed seasons or the establishment of permanent sanctuaries. While the latter is in many cases an ideal method of protecting animals, it is of course impracticable of application in the case of guano birds and many objects of chase or fishery.

Closed seasons of a few months produce good results in many cases, but such a principle of protection has the defect (often unappreciated) of being based upon an assumption that nothing essential to reproduction takes place except when the reproductive activities are externally evident. It seems sometimes to be assumed that destruction or disturbance of an animal *before* it spawns makes no difference. The closed season of months has, to be sure, its proper place, and is often the only feasible measure.

The second application is that the plan of temporary sanctuaries, as applied to guano-producing birds, has evidently worked and produced the desired results in high degree. The annual production has been *trebled* in ten years. Why then can not the plan be more generally applied in the case of natural objects requiring protection? It seems to be based upon a proper appreciation of physiological, "social" and ecological conditions as affecting successful reproduction. This is the principle, by the way, which for eight years has been advocated for the preservation of the fresh-water mussel resources of our interior streams, but which is as yet being given effect in a small way in only two states.

A final application to be made in this connection is not the least in importance. The enforcement of any broad and effective plan of protection of guano birds was confronted ten or twelve years ago with obstacles which one might fairly have considered insurmountable: foreign obligations with their customary difficulties of adjustment; national agricultural demands so exceeding the yearly production as to make temporary curtailment most aggravating to Peruvian agriculturists; restive political conditions such as usually demand the service of the present rather than of the future. How do such difficulties compare with those which confront the protection of fresh-water mussels or the development of the oyster industry in the Chesapeake Bay, for example? Surely, as Dr. Murphy has appropriately suggested, credit is due primarily to the patriotic and far-sighted citizens of Peru who accepted the preliminary sacrifices and *did what was evidently needed to be done.*

When we consider that the conservation measures cited were so promptly and fruitfully executed in one of our sister republics south of the equator it ought to "give us pause"—or else it should stimulate us to stop pausing and proceed to take like care of some of our own natural resources.

R. E. Coker

Bureau of Fisheries

NATIONAL TEMPERAMENT IN SCIENTIFIC INVESTIGATIONS

We have too long adjusted our scientific thought to the temperature of a European atmosphere. It should not be necessary to guard the voice of our scientists against the unnatural accent of the parrot. What was true of literature when Emerson read before the Phi Beta Kappa Society at Cambridge his celebrated oration on "The American Scholar" is now true of scientific investigation in the United States. "We have listened too long to the courtly muses of Europe." We have too much taken our problems from European investigators and have too little allowed nature to ask her own questions of us. These problems we have treated too much in the spirit of European (and

especially of German) investigation. Too little have we allowed rein to our own individuality in the choice of subject and the development of method.

Let it be granted that the people of Europe have attacked the problems and developed the methods best suited to their needs and their temperament. This seems to be true. The several important groups, following their own native inclinations, have marvelously succeeded in organizing nature in useful ways and have made conquests of the forces of the environment never approached by any other peoples. They have acted upon the realization that the best truth which any mind or any nation can create or discover is that which comes to it in the course of spontaneous activity. When we so proceed that our thinking is a natural expression of our native bent our discoveries will become typical of ourselves and we shall render into the whole worth of mankind a good which we can not attain by following the lead of another people. "He is great who is what he is from nature and who never reminds us of others."

Let us not run after the ways of another people. Let us also not run from the ways of another people. Let us follow our own ideals; let us develop our own spirit in the search for truth; let us be just to our own temperament. Our civilization is based on our European origin. We can not escape that fact. There is no need to try to run away from the nature which we have inherited. But there is a fundamental necessity that our thought shall not try to follow in the way pointed out by European thinkers of to-day; just as it is important that Europe shall continue to think in her own way and not seek to be guided by us.

We are a combination of social units which have not existed together before and are not now to be found together elsewhere. In some measure and in some phases we have developed our own national intellectual spirit; the present progress in American poetry, for instance, is not inspired by European models but is a native product arising from the basic foundation inherited from our European ancestry. But in scientific matters we still have a great tendency to attack problems set by European investigation rather than to follow our own more spontaneous activity and so find that truth which our temperament makes it possible for us to discover more easily than any other people.

Our attitude in this respect is strongly contrasted with that of the great nations of Europe. They have proceeded in ways of their own. Though science is cosmopolitan the scientific work of the greater groups in Europe is national in spirit. Notwithstanding the close interactions of the modern world and the systematic exchange of scientific knowledge, national traits find spontaneous expression in the researches of different countries.

British science is characterized by the spontaneity and individuality of the workers, with consequent large power in fundamental conceptions, so that a greater measure of dominant ideas in the science of to-day goes back to them perhaps than to those of any other people. They do not congregate in distinct schools and institutions. They are not localized in definite centers. No army of well-trained intellectual workers exists among them. No compact body of pupils there develops the work and ideas of any master. The self-reliant strength of natural genius dominates the scientific spirit. The British have produced a disproportionate number of new ideas and great departures. They have no university eager to nurse and develop new talent, so that the new thinker becomes devoted to nature. He lives close to the heart of things and nature rewards his independence of other thinkers.

German science is remarkable for the organization of the investigators and the resulting wealth of detail in developing the consequences of fundamental ideas once introduced and in preparing indexes and summaries of the current literature of discovery. The universities of Germany form the most characteristic institution of the German mind and afford the most perfect expression of its essential character, especially as regards sci-

entific work. These universities form one of the greatest intellectual agencies of the modern world. Among them arose the now universal habit of looking upon private study and research as a necessary qualification of the teacher. They teach not only knowledge but also research. To them largely is due the fact that German investigators stand under the generalship of a few great leading minds. They, more than any other single force, should be credited with the fact that so many persons in Germany are devoted to the pure ideal of knowledge for its own sake.

It is true that this ideal had been somewhat dimmed, even before the Great War, by the incessant demands of utilitarian motives; but it is to be hoped that it will again come into the ascendency and once more renew faith in the importance of the more ideal values.

There is danger that the ideal of knowledge for its own sake may dull the sense of values and lead one to a practise of treating trivial things with the same care as the matters of great moment. Indeed it seems that the Germany of the past has suffered in this respect.

> In no country has so much time and power been frittered away in following phantoms, and in systematizing empty notions, as in the Land of the Idea.

Emerson somewhere employs a beautiful fable of antiquity, pregnant with rich truth, that "the Gods in the beginning divided Man into men that he might be more helpful to himself, just as the hand was divided into fingers the better to answer its end." In our day Man has been broken into smaller pieces than ever before to make the men of the generation, a process which has been carried further in Germany perhaps than anywhere else. We have specialists instead of Man specializing. We have scientists instead of Man investigating nature. We go much further than that; we have the geologist, the biologist, the entomologist instead of Man intensely studying earth formations, living things, insects. Instead of having the mere specialist of a particular sort we should have Man investigating nature, having special tools to be sure and confining attention to a particular range of subject matter not too vast for him, but preeminently Man. The individual, in order to possess himself and to orient his work in the general activity of mankind, "must sometimes return from his own labor to embrace all other laborers." Man should not be so minutely divided and peddled out as to be spilled into drops that can not be gathered up again.

The more universal is the character of the national temperament the more difficult it is to single out its peculiar traits. Striking characteristics are more readily recognized than highly developed features of central importance. Whether from this fact or from some other it is not so easy to determine the characteristics of French thought as of British or German, when one confines his attention to the present generation of thinkers. But if one looks into the history of the past century he will have no occasion of doubt as to the way in which the scientific spirit has manifested itself in France. Its flower can be easily recognized to-day in the elegance and finish, sense of proportion and importance, careful emphasis of the greater matters, which are characteristic of the work of the French. Intimately connected with this and interacting with it to the advantage of both is the fact that France has done more than other countries to popularize science—a thing which must be recognized as affording a very valuable and powerful stimulus to the growth of the scientific spirit.

In the first decades of the last century the home of the scientific spirit was in France. Paris was the capital of the republic of exact truth. Interest in scientific discovery and creation was widespread among her people. The spirit of literature flourished alongside the spirit of exact researches and both found place in the same creative intellect. Out of this union of elements, too much separated in other countries, there grew up a tradition of literary excellence in scientific exposition which abides to the present and contributes in no small way to the comfort and delight which

every one must feel in reading a French scientific book or memoir.

The profound use of analytical methods and the reduction of scientific truth to rigorous yet pleasing mathematical form is characteristic of the French. The mechanical view of nature arose among them. They were the first to set out to see how far science and reasoning can go while disregarding the principle of individuality. Among them science first became "truly conscious of its true methods, its usefulness, its most becoming style, its inherent dignity, its past errors, its present triumphs, the endless career which lies before it, and the limits which it can not transgress."

Of the three countries which have led in scientific development it seems to be the impartial verdict of history that we owe to France the largest number of works perfect in form and substance and classical for all time; that the greatest bulk of scientific work, at least in more recent decades, has been produced in Germany; but that the new ideas which have fructified science, in earlier times and also in the nineteenth century, have arisen more frequently in Great Britain than in any other country.

Science is cosmopolitan and flourishes under many skies. But the spirit of scientific work is national. Each great people manifest their own characteristics. They develop truth by methods influenced by the peculiar bias native to their temperament and institutions. No prime contributions to knowledge have ever been made repeatedly through a long period of time by any people other than those who labored from a center situated at the heart of their life and social organization. The deep-lying unknown things in nature can be found out only by one who looks upon her with eyes of his own. A people who seek guidance outside of themselves will never be led in the paths of high achievement. Only during their minority can they afford to lean upon the strength of others more powerful than they. On coming of age it is indispensable that they shall work from a center of their own.

American science should now begin to render to the science of other countries a measure of support commensurate with that which it receives in turn in the mutual cooperation of all in the discovery of truth.

Up to the present we in America have not developed either a national spirit or a national tradition in scientific investigation. Research was not native to our soil and was not introduced by the first settlers. Along with the other portions of our European civilization our scientific attitude has come to us by inheritance. But we have now come to the time when American scientists may begin to proceed from an intellectual center of their own and make contributions in a characteristic spirit to the intellectual worth of mankind.

R. D. CARMICHAEL
UNIVERSITY OF ILLINOIS

SCIENTIFIC EVENTS

THE PROPOSED NEW CHALLENGER EXPEDITION

Nature announces that the council of the British Association has reluctantly decided that the organization of a new *Challenger* expedition, such as was suggested by Professor W. A. Herdman in his presidential address to the association at Cardiff last August, on an adequate scale can not be profitably promoted at the present time.

In accordance with the resolution passed by the general committee at the Cardiff meeting, the council appointed a special oceanographic committee to inquire into the details of the suggested project and to prepare a reasoned statement as to the need for such an expedition and its probable scale, scope, equipment, and cost. This memorandum has now been completed, and is available for use when the occasion arises; but in view of the present demand for economy in all national expenditure, and after consultation with trustworthy authorities, both scientific and administrative, the council at a recent meeting adopted a report by the general officers to the effect that, while retaining the scheme under consideration, no further action should be taken until circumstances seem more favorable for public expenditure upon such an undertaking.