

THE STUDY OF NATURAL HISTORY

A LECTURE under this title delivered at the Royal Artillery Institution, Woolwich, by the Rev. Canon Kingsley, has just been published, containing some admirable remarks on the relation between the soldier and the naturalist, from which we cannot forbear making the following extracts.

After some introductory matter, he proceeded:—

“It seemed to me, therefore, that I might, without impertinence, ask you to consider a branch of knowledge which is becoming yearly more and more important in the eyes of well-educated civilians—of which, therefore, the soldier ought at least to know something, in order to put him on a par with the general intelligence of the nation. . . .

“Let me, however, reassure those who may suppose, from the title of my lecture, that I am only going to recommend them to collect weeds and butterflies, ‘rats and mice, and such small deer.’ Far from it. The honourable title of Natural History has, and unwisely, been restricted too much of late years to the mere study of plants and animals; but I desire to restore the words to their original and proper meaning—the History of Nature; that is, of all that is born, and grows—in short, of all natural objects.

“If any one shall say, by that definition you make not only geology and chemistry branches of natural history, but meteorology and astronomy likewise—I cannot deny it; they deal, each of them, with realms of Nature. Geology is, literally, the natural history of soils and lands; chemistry the natural history of compounds, organic and inorganic; meteorology the natural history of climates; astronomy the natural history of planetary and solar bodies. And more, you cannot now study deeply any branch of what is popularly called Natural History—that is, plants and animals—without finding it necessary to learn something, and more and more as you go deeper, of those very sciences. As the marvellous interdependence of all natural objects and forces unfolds itself more and more, so the once separate sciences, which treated of different classes of natural objects, are forced to interpenetrate, as it were, and supplement themselves by knowledge borrowed from each other. Thus—to give a single instance—no man can now be a first-rate botanist unless he be also no mean meteorologist, no mean geologist, and—as Mr. Darwin has shown in his extraordinary discoveries about the fertilisation of plants by insects—no mean entomologist likewise.

“It is difficult, therefore, and indeed somewhat unwise and unfair, to put any limit to the term Natural History, save that it shall deal only with nature and with matter, and shall not pretend—as some would have it do just now—to go out of its own sphere to meddle with moral and spiritual matters. But, for practical purposes, we may define the natural history of any given spot as the history of the causes which have made it what it is, and filled it with the natural objects which it holds. And if any one would know how to study the natural history of a place, and how to write it, let him read—and if he has read its delightful pages in youth, read once again—that hitherto unrivalled little monograph, White’s ‘History of Selborne;’ and let him then try, by the light of improved science, to do for any district where he may be stationed what White did for Selborne nearly 100 years ago. Let him study its plants, its animals, its soils and rocks, and last, but not least, its scenery, as the total outcome of what the soils, and plants, and animals have made it. I say, have made it. How far the nature of the soils and the rocks will affect the scenery of a district may be well learnt from a very clever and interesting little book of Prof. Geikie’s on ‘The Scenery of Scotland, as affected by its Geological Structure.’ How far the plants and trees affect not merely the general beauty, the richness or barrenness of a country, but also its very shape; the rate at which the hills are destroyed and washed into the lowland; the rate at which the seaboard is being removed by the action of waves—all these are branches of study which is becoming more and more important.

“And even in the study of animals and their effects on the vegetation, questions of really deep interest will arise. You will find that certain plants and trees cannot thrive in a district, while others can, because the former are browsed down by cattle, or their seeds eaten by birds, and the latter are not; that certain seeds are carried in the coats of animals, or wafted abroad by winds—others are not; certain trees destroyed wholesale by insects, while others are not; that in a hundred ways the animal and vegetable life of a district act and react upon each

other, and that the climate, the average temperature, the maximum and minimum temperatures, the rainfall, act on them, and in the case of the vegetation, are reacted on again by them. The diminution of rainfall by the destruction of forests, its increase by re-planting them, and the effect of both on the healthiness or unhealthiness of a place—as in the case of the Mauritius, where a once healthy island has become pestilential, seemingly from the clearing away of the vegetation on the banks of streams—all this, though to study it deeply requires a fair knowledge of meteorology, and even a science or two more, is surely well worth the attention of any educated man who is put in charge of the health and lives of human beings.

“You will surely agree with me that the habit of mind required for such a study as this, is the very same as is required for successful military study. In fact, I should say that the same intellect which would develop into a great military man, would develop also into a great naturalist. I say, intellect. The military man would require—what the naturalist would not—over and above his intellect, a special force of will, in order to translate his theories into fact, and make his campaigns in the field and not merely on paper. But I am speaking only of the habit of mind required for study; of that inductive habit of mind which works, steadily and by rule, from the known to the unknown—that habit of mind of which it has been said:—‘The habit of seeing; the habit of knowing what we see; the habit of discerning differences and likenesses; the habit of classifying accordingly; the habit of searching for hypotheses which shall connect and explain those classified facts; the habit of verifying these hypotheses by applying them to fresh facts; the habit of throwing them away bravely if they will not fit; the habit of general patience, diligence, accuracy, reverence for facts for their own sake, and love of truth for its own sake; in one word, the habit of reverent and implicit obedience to the laws of Nature, whatever they may be—these are not merely intellectual, but also moral habits, which will stand men in practical good stead in every affair of life, and in every question, even the most awful, which may come before us as rational and social beings.’ And specially valuable are they, surely, to the military man, the very essence of whose study, to be successful, lies first in continuous and accurate observation, and then in calm and judicious arrangement.

“Therefore it is that I hold, and hold strongly, that the study of physical science, far from interfering with an officer’s studies, much less unfitting for them, must assist him in them, by keeping his mind always in the very attitude and the very temper which they require. . . .

“I should like to see the study of physical science an integral part of the curriculum of every military school. I would train the mind of the lad who was to become hereafter an officer in the army—and in the navy likewise—by accustoming him to careful observation of, and sound thought about, the face of nature—of the commonest objects under his feet, just as much as of the stars above his head; provided always that he learnt, not at second-hand from books, but where alone he can really learn either war or nature—in the field, by actual observation, actual experiment. A laboratory for chemical experiment is a good thing, it is true, as far as it goes; but I should prefer to the laboratory a naturalists’ field club, such as are prospering now at several of the best public schools, certain that the boys would get more of sound inductive habits of mind, as well as more health, manliness, and cheerfulness, amid scenes to remember which will be a joy for ever, than they ever can by bending over retorts and crucibles, amid smells even to remember which is a pain for ever.

“But I would, whether a field club existed or not, require of every young man entering the army or navy—indeed, of every young man entering any liberal profession whatsoever—a fair knowledge, such as would enable him to pass an examination, in what the Germans call *Erd-kunde* (earth-lore)—in that knowledge of the face of the earth and of its products for which we English have as yet cared so little that we have actually no English name for it, save the clumsy and questionable one of physical geography, and, I am sorry to say, hardly any readable school books about it, save Keith Johnston’s ‘Physical Atlas’—an acquaintance with which last I should certainly require of young men.

“It does seem most strange—or rather will seem most strange 100 years hence—that we, the nation of colonies, the nation of sailors, the nation of foreign commerce, the nation of foreign military stations, the nation of travellers for travelling’s sake, the

nation of which one man here and another there (as Schleiden sets forth in his book, 'The Plant,' in a charming ideal conversation at the Travellers' Club) has seen and enjoyed more of the wonders and beauties of this planet than the men of any nation, not even excepting the Germans—that this nation, I say, should as yet have done nothing, or all but nothing, to teach in her schools a knowledge of that planet, of which she needs to know more, and can if she will know more, than any other nation upon it. . . .

"Thus much I can say just now—and there is much more to be said—on the practical uses of natural history. But let me remind you, on the other side, if natural history will help you, you in return can help her; and would, I doubt not, help her, and help scientific men at home, if once you look fairly and steadily at the immense importance of natural history—of the knowledge of the 'face of the earth.' I believe that all will one day feel, more or less, that to know the earth *on* which we live, and the laws of it *by* which we live, is a sacred duty to ourselves, to our children after us, and to all whom we may have to command and to influence; ay, and a duty to God likewise. For is it not an act of common reverence and faith towards Him, if He has put us into a beautiful and wonderful place, and given us faculties by which we can see, and enjoy, and use that place—is it not a duty of reverence and faith towards Him to use those faculties, and to learn the lessons which He has laid open for us? If you feel that, as I say you all will some day feel, you will surely feel likewise that it will be a good deed—I do not say a necessary duty, but still a good deed and praiseworthy—to help physical science forward, and add your contributions, however small, to our general knowledge of the earth. And how much may be done for science by British officers, especially on foreign stations, I need not point out. I know that much has been done, chivalrously and well, by officers, and that men of science own them, and give them hearty thanks for their labours; but I should like, I confess, to see more done still. I should like to see every foreign station, what one or two highly-educated officers might easily make it—an advanced post of physical science, in regular communication with our scientific societies at home, sending to them accurate and methodic details of the natural history of each district—details $\frac{9}{10}$ of which might seem worthless in the eyes of the public, but which would all be precious in the eyes of scientific men, who know that no fact is really unimportant, and more, that while plodding patiently through seemingly unimportant facts, you may stumble on one of infinite importance, both scientific and practical.

"There are those, lastly, who have neither time nor taste for the technicalities, the nice distinctions, of formal natural history; who enjoy Nature, but as artists or as sportsmen, and not as men of science. Let them follow their bent freely: but let them not suppose that in following it they can do nothing towards enlarging our knowledge of Nature, especially when on foreign stations. So far from it, drawings ought always to be valuable, whether of plants, animals, or scenery, provided only they are accurate; and the more spirited and full of genius they are, the more accurate they are certain to be; for Nature being alive, a lifeless copy of her is necessarily an untrue copy. Most thankful to any officer for a mere sight of sketches will be the closet botanist, who, to his own sorrow, knows three-fourths of his plants only from dried specimens; or the closet zoologist, who knows his animals from skins and bones. And if any one answers, 'But I cannot draw,' I rejoin, you can at least photograph. If a young officer, going out to foreign parts, and knowing nothing at all about physical science, did me the honour to ask me what he could do for science, I should tell him, learn to photograph; take photographs of every strange bit of rock formation which strikes your fancy, and of every widely-extended view which may give a notion of the general lie of the country. Append, if you can, a note or two, saying whether a plain is rich or barren; whether the rock is sandstone, limestone, granitic, metamorphic, or volcanic lava; and if there be more rocks than one, which of them lies on the other; and send them to be exhibited at a meeting of the Geological Society. I doubt not that the learned gentlemen there will find in your photographs a valuable hint or two, for which they will be much obliged. I learnt, for instance, what seemed to me most valuable geological lessons, from mere glances at drawings—I believe from photographs—of the Abyssinian ranges about Magdala.

"Or again, let a man, if he knows nothing of botany, not trouble himself with collecting and drying specimens; let him simply photograph every strange tree or new plant he sees, to give a general notion of its species, its look; let him append,

where he can, a photograph of its leafage, flower, fruit, and send them to Dr. Hooker, or any distinguished botanist, and he will find that, though he may know nothing of botany, he will have pretty certainly increased the knowledge of those who do know.

"The sportsman, again—I mean the sportsman of that type which seems peculiar to these islands, who loves toil and danger for their own sakes; he surely is a naturalist, *ipso facto*, though he knows it not. He has those very habits of keen observation on which all sound knowledge of nature is based; and he, if he will—as he may do without interfering with his sport—can study the habits of the animals, among whom he spends wholesome and exciting days. . . .

"The two classes which will have an increasing, it may be a preponderating, influence on the fate of the human race for some time, will be the pupils of Aristotle and those of Alexander—the men of science and the soldiers. They, and they alone, will be left to rule; because they alone, each in his own sphere, have learnt to obey. It is therefore most needful for the welfare of society that they should pull with, and not against, each other; that they should understand each other, respect each other, take counsel with each other, supplement each other's defects, bring out each other's higher tendencies, counteract each other's lower ones. The scientific man has something to learn of you, gentlemen, which I doubt not that he will learn in good time. You, again, have (as I have been hinting to you to-night) something to learn of him, which you, I doubt not, will learn in good time likewise. Repeat, each of you according to his powers, the old friendship between Aristotle and Alexander; and so, from the sympathy and co-operation of you two, a class of thinkers and actors may yet arise which can save this nation, and the other civilised nations of the world, from that of which I had rather not speak, and wish that I did not think, too often and too earnestly.

"I may be a dreamer; and I may consider in my turn, as wilder dreamers than myself, certain persons who fancy that their only business in life is to make money, the scientific man's only business to show them how to make money, and the soldier's only business to guard their money for them. Be that as it may, the finest type of civilised man which we are likely to see for some generations to come, will be produced by a combination of the truly military with the truly scientific man. I say, I may be a dreamer: but you at least, as well as my scientific friends, will bear with me; for my dream is to your honour."

SCIENTIFIC INTELLIGENCE FROM AMERICA*

A LATE number of the *College Courant*, of New Haven, contains a detailed account of the exploring expedition under Prof. Marsh, which occupied the greater part of the warm season of 1871, and of which we have already furnished occasional notices to our readers. The general plan, as already stated, embraced excursions from several points, exploring as many different fields, with special reference to the examination of regions comparatively little known. The first starting-point of operations was Fort Wallace, and from this post the cretaceous deposits of South-Western Kansas and the region of the Smoky River were investigated. The second proceeded from Fort Bridger in Western Wyoming, to examine the ancient tertiary lake basin previously discovered by Prof. Marsh. Salt Lake City was the initial point of the third exploration, and the party proceeded thence to the Shoshone Falls, on Snake River, and from there to Boise City, in Idaho; thence they passed over the Blue Mountains to the head waters of the John Day River, and followed down to Cañon City. On the route they made extensive collections of fossil fishes. They also explored two basins, one of the pliocene and the other of the miocene age, and in these remains of extinct animals were found in large numbers; the upper bed containing the bones of the elephant, rhinoceros, lion, &c., with several species of the fossil horse; the lower and older basin was found to contain species of the rhinoceros, oreodon, turtles, &c. From this point the party proceeded to the Columbia, and thence to Portland, Oregon, where they took a steamer to San Francisco. Here the expedition divided, a portion going to the Yosemite and elsewhere, while several, with Prof. Marsh, sailed, *via* Panama, for New York, reaching that

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