of us, and be reflected from some upper stratum of air of different density from that below. Hofer evidently considered himself responsible for an explanation of the origin of the sound, and frequently remarked that it reminded him of the noise made by the escaping steam of the so-called Steamboat Geyser, on the eastern shore of Yellowstone Lake, about 6 miles from the outlet. I passed between Steamboat Point and Stevenson's Island twice, but was not near enough either time to hear the escaping steam. Moreover, on each occasion the wind was blowing a lively breeze in the direction of Steamboat Point. On the afternoon of August 9th, at 3.20 P.M. while in a row-boat on the south eastern arm of Yellowstone Lake, near the entrance of the upper Yellowstone River, I heard a sound overhead, like rushing wind, or like some invisible but comparatively dense body moving very rapidly through the air, and not very far above our heads. It appeared to be travelling from east to west. It did not have the semi-metallic, vibrating, sky-filling, echoing resonance of the overhead noises that I had heard before, and was of rather shorter duration. It had, however, the same sound-like rapidity of the other. The sky was clear except for a few light fleecy and feathery clouds, and there was just enough wind blowing to ruffle the surface of the water. If this sound was produced by a current of air in motion overhead, it is difficult to understand why it did not give some account of itself, either in the clouds that were floating at different levels in the upper air, or among the pines which covered the slope that rose more than 1000 feet above our heads, or on the waters of the lake itself.

I am inclined to attribute the typical echoing noise to some initial sound, like that of escaping steam for example, from some place like Steamboat Geyser, and which is reflected by some upper stratum of air, that is differently heated from that below by the rays of the sun as they come over the high mountain ridges to the east of the lake. The sound may thus be reflected over the low divides west to Shoshone, and south to Heart Lake, or even farther in the direction of Jackson's Lake. I am not strenuous for this theory, and will be glad to hear a better explanation of this phenomenon. I have a dim recollection of some legend of phantom huntsmen, and a pack of ghostly but vocal hounds which haunt the sky of the Hartz Mountains. Can any one tell whether there is any natural phenomenon belonging to mountains or mountain lakes, which could give foundation to such legend?

The phenomenon has not yet been successfully explained, and I do not know that any similar phenomenon has been observed elsewhere.

It is to be hoped that some one will investigate the matter soon and give a scientific explanation of its cause.

THE PLACE OF MUSEUMS IN EDUCATION.

BY THOMAS GREENWOOD, LONDON, ENGLAND.

THE most casual observer of educational methods could not fail to notice that the receptive mind of a child or a youth learns from an infinite variety of sources. We all know that we begin at one end of education, but there is no period in life of the most aged where the other end is reached. Frequently, again, that information which does not absolutely form part of the ordinary process of education, but which comes from unexpected quarters, is of as great a service in the development of the mind as any set lessons can possibly be. Whatever becomes suggestive to the mind is of educational value. That Museums have from their very nature the very essence of this suggestiveness is patent. It may be true that of themselves alone they are powerless to educate, but they can be instrumental and useful in aiding the educated to excite a desire for knowledge in the ignorant. The working man or agricultural laborer who spends his holiday in a walk through any well-arranged Museum cannot fail to come away with a deeply-rooted and reverential sense of the extent of knowledge possessed by his fellow men. It is not the objects themselves that he sees there, and wonders at, that cause this impression, so much as the order and evident science which he cannot but recognize in the manner in which they are grouped and arranged. He learns that there is a meaning and value in every object, however insignificant, and that there is a way of looking at things common and rare, distinct from the regarding them as useless, useful, or merely curious. These three last terms would be found to be the very common classification of all objects in a Museum by the uninformed and uninitiated.

After a holiday spent in a Museum the working man goes home and cons over what he has seen at his leisure, and very probably on the next summer holiday, or a Sunday afternoon's walk with his wife and little ones, he discovers that he has acquired a new interest in the common things he sees around him. He begins to discover that the stones, the flowers, the creatures of all kinds that throng around him are not, after all, so very commonplace as he had previously thought them. He looks at them with a pleasure not before experienced, and talks of them to his children with sundry references to things like them which he saw in the Museum. He has gained a new sense, a craving for natural knowledge, and such a craving may, possibly, in course of time, quench another and lower craving which may at one time have held him in bondage—that for intoxicants or vicious excitement of one description or another.

The craving for intoxicants or excitement is often as much a result as a cause. The toilers have few things to occupy their mind, and frequently in their home surroundings much cheerlessness and discomfort. Life is for very many a hard daily grind for mere existence, with little or no relief from the daily round of the struggle to make ends meet. These, and other conditions under which so many live, cannot fail to produce tastes and likings which are not qualified to tend to the uplifting of the mind and the desires by which their life is governed.

It is only those who come closely in contact with the more intelligent of the working classes, who know the nobility of character and the earnest reaching out towards higher things to be found among them, who can be familiar with the intense longing to have within their reach institutions such as Museums, Art Galleries, and Free Libraries, to which they can have easy access. That such as these use the institutions which already exist is most amply and conclusively proved by the ocular demonstration of those who have visited the Museums in any of the large towns of the country.

The nation should never forget that some of its greatest benefactors have belonged to this class of intelligent working men. James Watt, the engineer, Hugh Miller, the stonemason geologist, Stephenson, the collier-railway projector, Arkwright, the weaver-inventor, and scores of others who could be named. Where, indeed, should we have stood as a nation had it not been for the sturdy common sense of the intelligent and thrifty working classes?

Until very recently the great defect of our system of education has been the neglect of educating the observing powers—a very distinct matter, be it noted, from scientific or industrial instruction. The confounding of the two is evident in many books which have from time to

time been published. There are not a few who seem to imagine that the elements that should constitute a sound and manly education are antagonistic; that the cultivation of taste through purely literary studies and of reasoning through logic and mathematics, one or both, is opposed to the training in the equally important matter of observation through these sciences that are descriptive and experimental. There is considerable inconsistency in any such idea, and educational leaders are now universally recognizing the need there is for not giving too much attention to one class of mental training to the exclusion of the rest. Equal development and strengthening of all are necessary for the constitution of a well-ordered mind.

A consensus of opinion is now apparent that this method is erroneous, and the Universities are taking the lead by emphasizing to a less degree the merits of a purely classical education. The conductors of private schools, again, are beginning to see the great need which exists for a practical acquaintence with the leading Continental languages, and the Board school curriculum is rapidly becoming to mean a year or two devoted to technical instruction and manual training. It is almost impossible satisfactorily and effectually to conduct the latter without the aid of Museums, and these institutions are destined to occupy a most important place in this respect. Specimens of raw materials with labels clearly defining their properties and uses, and the relation that one kind of raw material bears to another kind, are now, in many instances, looked upon as indispensable scholastic aids.

The Manchester Exhibition was particularly useful in this respect, for there were many sections in which the various stages of the raw material up to the perfected article were shown, and it may safely be stated that no exhibition of modern times possessed in this way a wider and more real educational value than the very successful one held in Manchester in 1887. The silk, chemical, pottery, and other sections were especially complete in this respect. The number of models of an almost infinite variety in these departments had a value attaching to them as a means of instruction, which could not fail to be useful to the many thousands of the youth of both sexes who visited the buildings at Old Trafford.

Vast collections of objects, whether in Museums or Exhibitions for educational purposes, do not always accomplish the object in view. Doubtless the vastness of the collections in some of own Exhibitions in London, and those which have been held in other cities, has been very impressive, but it may be gravely questioned whether any mind has carried away many useful impressions from the infinite multitude upon which he has had an opportunity of looking. The general mental state very frequently produced by such a numerous display is that of distraction. There is such a state of mind as picture drunkenness or Museum drunkenness, and this should be carefully guarded against. There should be in Museums and Art Galleries a more extensive use of folding screens, so that anyone so disposed could shut themselves off from the crowd while they study a case or a picture minutely. A few striking objects well and carefully studied are infinitely better and of greater educational worth than a number of things at which there is only a casual glance.

Modelling, whether in cardboard, wood, or clay, is an invaluable means of cultivating and developing the manipulative skill of youths. All know how readily a boy will take to the construction of a boat, or a girl to dress a doll, and in this lies the indiction that most young people will take as readily to modelling as the boys do to cricket and the girls to their skipping ropes.

Charles Kingsley, addressing working men, with reference to their requirements, says: "We must acquire something of that industrious habit of mind which the study of Natural Science gives. The art of seeing, the art of knowing what you see, the art of comparing, of perceiving true likenesses and true differences, and so of classifying and arranging what you see, the art of connecting facts together in your own mind in chains of cause and effect, and that accurately, patiently, calmly, without prejudice, vanity, or temper."

The late Ralph Waldo Emerson, writing on the same subject, says: "Manual labor is the study of the external world." This kind of manual labor should be taught in schools. Children's habit of collecting and arranging objects of interest should be encouraged. The study of a single branch of natural science, such as constructive botany, may be made the means of cultivating habits of neatness, order and skill. The analysis of plant forms would illustrate the application of geometry to ornamental purposes, and open up wide fields for the development of decorative taste and manipulative skill. But cramped by the restrictive rules of our result system, these sources of useful culture are neglected; and, therefore, our children are turned out of the educational mill imperfectly prepared for the further processes necessary to qualify them for taking their part in the struggle for existence.

All this proves the necessity for Museums having the closest possible connection with elementary as well as advanced education. The uses of constructive botany, as referred to in the short quotation from Emerson, are especially helpful as a suggestive study to the mind. For this branch of education Museums are the best text-books which can be provided, but in order that specimens in these branches of natural science be properly and usefully studied they require to be explained by competent teachers. It is in this respect that practical and efficient curators can be of the greatest service in giving short and informal explanations of some of the specimens in their Museums.

As far back as 1853, there was delivered at the Museum of Economical Geology, in London, a lecture by the late Professor Edward Forbes, on the Educational Uses of Museums. In one part of this lecture he spoke as follows: "In their educational aspect, considered apart from their educational applications, the value of Museums must in a great measure depend on the perfection of their arrangement, and the leading ideas regulating the classification of their contents. The educated youth ought, in a well-arranged Museum, to be able to instruct himself in the studies of which its contents are illustrations, with facility and advantage. On the officers in charge of the institution there consequently falls a heavy responsibility. It is not sufficient that they should be well versed in the department of science, antiquities, or art committed to their charge. They may be prodigies of learning, and yet utterly unfitted for their posts. They must be men mindful of the main end and purpose in view, and of the best way of communicating knowledge according to its kind, not merely to those who are already men of science, historians, or connoisseurs, but equally to those who, as yet ignorant, desire to learn, or in whom it is desirable that a thirst for learning should be incited." Among the most useful Museums are those which are made accessory to professional instruction, and there are many such in the country, but almost all confined to purposes of professional education, and not adapted or open to the general public. The Museums of our Universities and Colleges are, for the most part, utilised in this way, but the advantages derived from them are confined to a limited class of persons.

This educating the children in the schools in the elements of natural science is most essential, especially in

country districts. When persons reach mature age without knowing anything about Natural History objects, they find it is then too much trouble to investigate these subjects. But by getting at them when young, by simple and forcible illustrations, they are bound to carry it forward with them to a certain extent, and if there should come a time when they are in a position to give time to study, the first they will take up and pursue with patience will probably be some subject of this nature, merely for the pleasure of the study. On the other hand, if they have no inclination to work, they will not forget the pleasant hours they spent when they sat listening to some explanation of an object so familiar, which will create a tendency to put their hands to the bottom of their pockets and act feelingly. If children could be taught to see God in Nature and the wonders which He controls, without cramming the brain with so much theory, by giving them a run into the country along with some one to explain, it would conduce a great deal more to their general health and happiness. Country Musueums want illustrating and simplifying as much as possible. Call a spade a spade, *i. e.*, give the local name as well as the scientific one. This education would be another great saving to the nation if it were universal. Half the things that are dug up now are only saved by the merest chance, because the men digging do not care what they are striking their pick through. This would be altered altogether if they had been taught in early youth to take notice of the value and interest there is attaching, often, to things dug up from the earth.

Thirty-five years ago Professor Forbes said: "I cannot help hoping that the time will come when every British town even of moderate size will be able to boast of possessing public institutions for the education and instruction of its adults as well as its youthful and childish population; when it shall have a well-organised Museum wherein collections of natural bodies shall be displayed, not with regard to show or curiosity, but according to their illustration of the analogies and affinities of organised and unorganised objects, so that the visitor may at a glance learn something of the laws of nature; wherein the products of the surrounding district, animate and inanimate, shall be scientifically marshalled, and their industrial applications carefully and suggestively illustrated; wherein the memorials of the neighbouring province, and the races that have peopled it, shall be reverently assembled, and learnedly yet popularly explained; when each town shall have a library, the property of the public, and freely opened to the well-conducted reader of every class; when its public walks and parks (too many as yet existing only in prospect) shall be made instructors in botany and agriculture; when it shall have a gallery of its own, possibly not boasting of the most famous pictures or statues, but nevertheless showing good examples of sound art: examples of the history and purpose of design, and, above all, the best specimens to be procured of works of genius by its own natives who have deservedly risen to fame. When that good time comes true-hearted citizens will decorate their streets and squares with statues and memorials of the wise and worthy men and women who have adorned their province—not merely of kings, statesmen or warriors, but of philosophers, poets, men of science, philanthropists and great workmen."

How far are we from yet realizing this ideal, and how slowly we seem to progress in so desirable a direction! Still there are many signs that the conscience of the nation is at last awakened, and if we see to it that all the discussions at present filling the air do not end simply in talk, but that practical good shall be the outcome, then our progress during the coming twenty-five years will not be so discouraging. In no better way can this ideal be realized than by an acute recognition of the place Museums should occupy in our national system of education.

LETTERS TO THE EDITOR.

**Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Feigned Death in Snakes.

After reading the letter on "Feigned Death in Snakes" in *Science* of Oct. 13, one is left with the impression that Heterodon, or the "blowing viper," or, as he is known in New Jersey, the "adder," actually bites itself in the side and then pretends to die.

As the adders are very common in the southern part of this state, I have had countless opportunities for watching this habit of feigning death and have never seen anything like an attempt, or even a pretended attempt, to bite themselves. The teeth of Heterodon are hardly large enough to scratch a tender hand, much less bite through or between the heavy folds of the snake's horny skin. How this supposition came about is easily seen, when the snake, after finding it cannot escape, is about to turn over on its back, throws its mouth wide open, tucks its head under its body and suddenly twists over, the whole affair, unless carefully watched, looks decidedly suicidal. But the snake has not bitten itself and had no intention of so doing.

The account referred to is quite right in believing that this is not a "faint from fear." The convolutions of the serpentine hemispheres are undoubtedly well twisted, but we can hardly credit the reptile with so delicately a balanced organism as to admit of its fainting.

The measure, I believe, is purely a protective one, and often of the greatest service. Heterodon is the slowest and most clumsy of all our snakes, and as it cannot depend on flight for safety, it needs other means for protection, of which this trick in question is among the best, as is also its beautifully adaptive coloration. The spewing out of the contents of the stomach is similar to that habit in turkey buzzards and many other creatures, and an additional aid in escaping their enemies.

The whole affair, then, is not a "pretended suicide" but a pretended death, with a stink solely for the snake's protection.

Dallas L. Sharp.

Bridgeton, N. J., Oct. 24.

The Destruction of Wild Plants.

The destruction of wild plants by students of botany and collectors has become appalling. Botany is becoming a universal study in the schools, and one hundred young people each gathering one plant to use and ten to twenty to throw away, soon exterminate the rarer plants.

The solution of the problem is at hand. Let teachers use only cultivated plants in their work. Of these an abundance can always be had. Turn the attention of students from the mere collection and analysis of plants to the more important subjects of plant physiology and economic botany. The time has come for a change.

G. G. Groff.

Lewisburgh, Pa.

Minnesota Mounds.

In reply to Mr. F. B. Sumner's criticism on my notes on Minnesota Mounds I would state that he should point out and correct some of my "gross misrepresentations" instead of indulging in absurd statements not bearing on the subject. Would also suggest that he read the article