

met with in most parts of the country arises from the suspicion with which the spoilt "practical man" regards the whole scheme of education designed to benefit him. No class harbours this prejudice more than farmers and their labourers. Almost every local authority complains of the apathy, or the opposition, of agriculturists to the extension of knowledge in the scientific principles of agriculture. When the Derbyshire Committee approached this branch of their work, they hesitated to establish agriculture classes under the auspices of the Department of Science and Art, because such classes are open to undesirable objections from this section of the community. In the first place, there is an appearance of attempting to teach "farming" in the lecture-room, and secondly, the teachers who are qualified to give most of the information contained in the Science and Art syllabus, are usually not actually engaged in the agricultural industry itself. Both these difficulties have been cleverly met by the Committee in this way:—"In place of the 'Agriculture' Classes of the Science and Art Department, the Committee are anxious that the students in rural evening schools shall go through a course of elementary science, which shall be of a very simple but thoroughly scientific nature. It is intended that the student shall be taught by actual experiment, and shall thus come to appreciate that the results of science are not fanciful, but are conclusions drawn from a study of actual facts. The phenomena studied in this course of lessons are of a general character, but are also largely chosen from the domain of agriculture, so that without any suspicion that the schoolmaster is attempting to teach 'farming,' the student learns a number of principles which cannot fail to affect him in practice.

"The great merits of this scheme of teaching elementary science in rural evening schools in place of starting Science and Art Department 'Agriculture' Classes are that the students are kept together year after year, studying other subjects which go to make up the curriculum, the Elementary Science course extending over two or three years, so that a first set of pupils is ready when the older ones have passed through; and further, there is no suspicion of teaching what can only be learned on the farm."

The scheme is very attractive, and good results may be expected from its application in Derbyshire. It enforces the fact that a knowledge of the elementary principles of science is the only sound basis upon which to build courses of technology.

The county of Derby is more dependent upon the mining industry than on any other; therefore its organisation of instruction in mining deserves a word of remark. It attempted to provide the instruction by means of courses of lectures delivered in a certain number of pit villages, but the results were hardly successful. The teaching was afterwards given by local men who had practical knowledge of mining, and some acquaintance with collateral branches of science, and this scheme was more satisfactory than the former. The point to be borne in mind in all such cases is that chemistry, steam, geology, some branches of physics, and mechanical drawing should form a part of the education of every mining student. With reference to local teachers, a word may be necessary. There is, of course, a tendency in many districts to patronise local ability, but it should always be borne in mind that the local man is not of necessity the man who will do best. In the expenditure of public money, it ought to be a guiding principle that the best teachers available by advertisement and good salaries should always be selected.

The evergreen complaint of Technical Education Committees finds expression in the report from Derbyshire. In connection with the subject of evening continuation schools, we read: "The Committee have found that one of the great difficulties which the ordinary student experiences in receiving instruction in every kind of technical subject is the lack of sufficient preliminary knowledge. His elementary school education has very largely leaked away, instead of having been continued to the point giving easy comprehension of scientific principles and problems. This implies that the national expenditure on elementary education is very largely wasted without some supplementary scheme by which the instruction given shall be conserved and continued until the student is old enough to grasp its importance." This puts the whole matter in a nutshell. When the average boy leaves the elementary school, at about fourteen years of age, he regards his education as completed, with the result that he has no interest whatever in schools or classes of any educational value. Committees must not hope to attract the majority of working lads into evening continuation schools,

however diversified their prospectuses may be. Only here and there can pupils be found who have begun to see the depths of their ignorance, but these are the minds to nurture, and for their benefit systems of evening-classes should be constructed.

Before the era of the County Councils, the principal means for the spread of instruction in elementary science was undoubtedly the classes of the Science and Art Department. Testimony is borne to this in the report referred to. We read:

"It has been the custom in many educational quarters to criticise and condemn the methods of that Department, and to create an impression that but little good has been accomplished. The contrary of this is undoubtedly the case. In all manufacturing centres it will be found that there are numbers of persons applying to every kind of industry scientific principles and knowledge gained at Science and Art Classes, and which could not have been gained anywhere else during the last thirty-five years." The Department is very well able to take care of itself, but this statement of fact may be profitably considered by those who disparage its usefulness.

If there is one thing our educational system lacks more than another, it is proper facilities for secondary education. Recognising that a good education in a secondary school is the only means by which the highest branches of technical instruction could be approached, the Derbyshire Committee offered for competition sixty scholarships tenable at secondary schools. After the awards had been made, it was found that only six out of the sixty successful candidates chose schools in the county, and that there was only one school in the administrative county available for the girls who had won scholarships. An inspection of the Grammar Schools, and similar institutions in the county, with a view to determining their educational conditions and needs, revealed a general want of proper equipment; indeed, only one out of nine secondary schools had a chemical laboratory. Derbyshire is certainly not alone in this deplorable state of things, which it will take some years to improve. The fact that the defects in our educational system are being exposed, and that attempts are being made to meet them fairly, is a clear promise of progress. If the Technical Instruction Committees had done no more than reveal the inefficiency and insufficiency of scientific instruction in the counties of England, they would have furthered the interests of science. But as they have also helped to organise and increase the facilities for such instruction, they have worked in no mean way for the extension of natural knowledge. Encouragement and friendly guidance is all that is required to render the work even more valuable in the future than it has been in the past.

R. A. GREGORY.

SCIENCE IN THE MAGAZINES.

FIRST in importance among the contributions to the February magazines is a collection of opinions on forest preservation, published in the *Century*. In response to a request from the editor of that magazine, a number of persons interested in arboriculture sent their views as to the general need of a thorough, scientific, and permanent system of forest management in the United States, and specifically as to the plan suggested by Prof. C. S. Sargent, which comprised the following features:—

(1) Forestry instruction at West Point; the establishment of a chair of Forestry at the United States Military Academy, to be supplemented by practical study in the woods and by personal inspection of foreign systems of forestry.

(2) An experimental forest reservation; the purchase on the Highlands near West Point, or elsewhere, of a small territory for the use of the proposed new branch of instruction.

(3) Control by educated officers; the assignment of the best educated of these officers to the supervision of the forest reservations.

(4) The enlistment of a forest guard; a body of local foresters, to be specially enlisted for the purpose of carrying out the principles of forestry thus taught.

The experts consulted agree in the opinion that the United States needs a thoroughly scientific and permanent system of forest management in the interests of the people of to-day, and of future generations. But the general feeling seems to be that the management of the forests should not be placed under any military organisation. As to the suggestion to increase the curriculum of the U.S. Military Academy so as to cover

instruction in forestry, it is rightly pointed out that a course in forestry which is merely an adjunct to a military education must fail to produce the highest efficiency as foresters in the officers who take it. "Adequate training in so large a subject," is remarked by one of the correspondents, "can be reached only by long and undivided attention." And further, as Prof. Cleveland Abbe says, "the arts of warfare are a special application of the arts of peace, and it is a perversion of the military school to make it a rival of the civilian schools of engineering, chemistry, forestry, &c." The general opinion appears to be that for the preservation and management of forest reservations, a permanent body of foresters is required, but it should be composed of practical woodmen who have devoted some years to the study of forestry. If we may express an opinion upon the matter, to us this seems the only view which can have any support from scientific men. To make forestry a subsidiary branch of a military education, would be to establish scant provision for the science. If merely the protection of forest reservation be aimed at, Prof. Sargent's plan probably offers the easiest way of obtaining it; but if the forests are to be developed, a forest school, where foresters can be scientifically trained, becomes essential.

Another contribution to the *Century* is the sad story of the death of Emin Pasha, told by Mr. R. Dorsey Mohun, the United States agent in the Congo Free State. In April of last year, Mr. Mohun arrested and took the confessions of the two Arab slaves, named Ismailia and Mamba, who had killed Emin. The following is a brief statement of the melancholy facts:—In the Unyoro country, to the west of the Victoria River, Emin came upon an Arab camp, under the command of Said ben Abedi. He expressed his intention of making his way to Kibonge, about eighty miles south of Stanley Falls, and it was arranged that his force, numbering about 150 people, and Said's, should travel together. On October 5, 1892, Emin and Said arrived at the small village of Kinena, which lies 150 miles to the north-east of Kibonge. Said then went on to inform the Kibonge chief that the white man was coming, Ismailia and Mamba going with him. About twenty days later, Mamba returned with a letter to Emin, saying that safe conduct to Kibonge should be given; but the Kibonge chief sent another letter to the Kinena chief by Ismailia, containing instructions to kill Emin. The Pasha was induced to send his men into the plantations on a pretext, and while they were away he was murdered, and his head sent to Kibonge. This appears to have occurred on the morning of October 28, 1892. Emin's head was sent by Kibonge to Munie-Mohara at Nyangwe, the reason being, Mr. Mohun thinks, that Kibonge wished to show that he could kill a white man as well as Munie-Mohara, who had ordered the destruction of Hodister's expedition five months previously. "Not the slightest suspicion," says Mr. Mohun, "attaches to Said ben Abedi of having had any connection with Emin Pasha's death, which is regarded by the Arabs with whom I have talked as a stupid error on the part of Kibonge, who committed the crime simply to place himself on the same level as Munie-Mohara, who had killed Hodister. I do not believe, either, that Tippoo Tib had any hand in the crime, which must have been as great a surprise to him and to his son, Sefu, and his nephew, Rachid, who was the Governor of Stanley Falls, as it was to us." An article on "New Weapons of the United States Army," also in the *Century*, and the eighteen pictures and diagrams which illustrate it, will interest many of our readers.

Dr. Charles L. Dana writes on "Giants and Gintism," in *Scribner*. Two years ago a man nearly seven feet in height, possessing very large feet, hands and head, came under his notice, and was found to be a victim of the peculiar disease known as acromegaly. The man died from the effects of his disease, and a portion of the brain—the pituitary body—was then found to be enlarged to many times its original size. This gave support to the idea that enlargement of the pituitary body is the cause of the gigantic growth of the extremities in acromegaly, and that giants generally are not simply freaks, but victims of a nervous disorder. The skeleton of the famous Irish giant was studied some time ago by Prof. Cunningham, and found to be characteristic of a case of acromegaly, and an examination of photographs of nearly all the living giants now on exhibition leads Dr. Dana to believe that about one half of them are acromegalics. According to Dr. Dana, "extraordinary size is a disease, a neurosis of nutrition, rather than a chance disturbance of development. . . . It is possible by certain kinds

of gland-feeding, to increase the stature of dwarfed persons very rapidly. There is, for example, a gland called the 'thyroid body' lying in the neck, the juice of which, when fed to certain kinds of dwarfs (coctins) causes them rapidly to grow. Experiments in feeding animals and men with the pituitary body are now in progress."

"The Method of Oganic Evolution" is expounded by Dr. A. R. Wallace in the *Fortnightly*, the article being really a critical and adverse review of Mr. Bateson's views on discontinuous variation, as set forth in "Materials for the Study of Variation." A second article on discontinuity in evolution, dealing with the theories advanced by Mr. Galton, will appear in a future number.

A posthumous essay, by Dr. G. J. Romanes, entitled "Longevity and Death," appears in the current number of *The Monist*, to which it was sent by Prof. C. Lloyd Morgan. In it an unpublished essay, written in 1875, is quoted, in which occur the following passages:—

"Those species whose ancestral types have frequently been required to vary would have gained much during the history of their descent, by having their constituent individuals short-lived; for in this way a comparatively great number of opportunities would have been afforded for the requisite variation to arise: in other words, a comparatively great number of variations would have occurred in a given time. Hence it seems natural to infer that it is in the power of Natural Selection to affect the curtailment of individual life, wherever such curtailment would be of advantage to the species, that is to say, wherever flexibility of type is required. Of course, length of life is not the only factor which determines flexibility of type. There are at least three other such factors: (1) the period at which puberty sets in, (2) the number of times the individual breeds during its life-time, and (3) the number of young which it bears at each time of breeding. Nevertheless, it is true that the length of life is a highly important factor, because, if the individual is short-lived, it becomes a necessary condition to the continuance of the species that parturition should be frequent. Or, more generally, there must be more or less of a direct proportion between the potential longevity of every species and the frequency of parturitions characteristic of that species—if not also of the number of offspring in each. Now, as Mr. Lankester has pointed out, there is, as a matter of fact, a highly remarkable correlation between potential longevity in the individual and frequency of parturition, as well as of numbers constituting the litter which are distinctive of the species. This correlation he attributes to generative expenditure acting directly to the curtailment of life; but in holding this view, I suspect that he is mistaking cause for effect. I do not think it is generative expenditure which causes curtailment of life, but that it is curtailment of life by Natural Selection which causes the high generative expenditure within the lessened period. It is as though all the conditions needed to secure flexibility of type were adaptively associated in these species which have survived in a comparatively fluctuating environment. Moreover, it is worth observing that all the organisms to which Mr. Lankester ascribes a practically unlimited potentiality of life, are organisms which, as far as we can judge, must always have been exposed to uniform conditions of life."

In addition to this, *The Monist* contains an article by Dr. E. Montgomery, who attempts "first to gain a scientifically justified and logically consistent physical basis, upon which a naturalistic conception of vitality can be reared; and then, to show to what special physical conditions vital activities and vital organisations owe their existence." We also notice a metaphysical paper on "The Natural Storage of Energy," by Mr. Lester F. Ward.

Pascal is the subject of a paper, by the late Mr Walter Pater, in the *Contemporary*, but his scientific researches are not dealt with. Towards the end of the notice, there is a note on the influence of imagination on his work. It is: "Hidden under the apparent exactness of his favourite studies, imagination, even in them, played a large part. Physics, mathematics, were with him largely matters of intuition, anticipation, precocious discovery, short cuts, superb guessing. It was the inventive element in his work and his way of putting things that surprised those best able to judge. He might have discovered the mathematical sciences for himself, it is alleged, had his father, as he once had a mind to do, withheld him from instruction in them." A bright and sensible paper on "Nervous Diseases and Modern

Life" is contributed to the same review by Prof. Clifford Allbutt. There is also a paper of interest to physical geographers, its title being "The Evolution of Cities."

The current *Quarterly Review* has among its articles a sketch of the history of the Ordnance Survey, wherein we read "the scope of the undertaking exceeds any programme heretofore attempted by any Government, the mode and style of its execution are second to none, either from a scientific, artistic, or utilitarian point of view, and the cost of the work, stroke for stroke, is probably lower than that paid by any other nation for a similar purpose." Prof. Huxley's collected essays, and other works, are reviewed under the title "Prof. Huxley's Creed," and in the article "England in Egypt," the irrigation of Egypt, and the construction of the Philæ dam, are noticed.

The *Keliquary and Illustrated Archaeologist* is rich in good illustrations. Among the articles we notice an account of the exploration of a Hunnic cemetery at Czika, near Buda-Pesth. Parts of a number of skeletons have been found, and a complete skeleton of a woman, six feet three inches in length. Weapons, stirrups, earthenware vessels, and various ornaments have also been found. "The Burning of the Clavie," a ceremony still carried out on the last night of the old year at Burghhead, in the north of Scotland, is described by Mr. H. W. Young. The custom appears to have come down from the most remote ages. The natives of Burghhead assert that it is a Druidical worship, while Mr. Young believes it to be simply a revival of the worship of Baal—a remnant of that great fire worship which prevailed over the whole world as known to the ancients. In the notes is an illustration of the ancient Egyptian tomb in the island of Elephantina, discovered and explored by H. R. H. the Crown Princess of Sweden and Norway, and an illustrated description of the re-erection of those interesting pre-historic monuments, the Dartmoor menhirs. Recent investigations have yielded some evidence which connects these stone-rows with the Neolithic period.

A passing notice must suffice for the remaining articles on scientific subjects in the magazines received by us. *Good Words* contains Sir Robert Ball's concluding paper on "Sir Isaac Newton," and a brief paper "On the Anti-toxin Cure for Diphtheria," by Dr. W. J. Fleming. A visit to the tomb at Dashur, where the jewels of an Egyptian princess of the Twelfth Dynasty were found last year, is described by Mrs. St. Loe Strachey in the *National*. The *Humanitarian* has an article on "The Prevalence of Nervous Diseases," by Dr. S. Althaus. "Some Curiosities of Modern Photography" are brought together by Mr. W. G. FitzGerald in the *Strand Magazine*. The illustration he gives of an image photographed through the eye of a beetle is, however, quite eclipsed by a photograph taken by Dr. Sitta through the lenses of the composite eye of a water-beetle, and reproduced in *Knowledge* for July 1894. Mr. Grant Allen contributes a rhapsody on quails to the *English Illustrated*. *Chambers's Journal* contains its usual complement of readable articles on scientific topics.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—In a Congregation held on Tuesday, February 12, the amendments to the proposed Statute on Research Degrees came under consideration. There were sixty-three amendments, and of these only fourteen came under consideration, as the debates on some of them were of some length. The first amendment, proposed by the Provost of Oriel, and seconded by Prof. Odling and M. Strachan Davidson, proposed that the Degree of Bachelor of Arts should be substituted for the proposed Degrees of Bachelor of Letters and Bachelor of Science. After a prolonged debate the amendment was negatived by 137 votes against 33.

An amendment by Prof. Case, defining "Science" as including Mathematics, Natural Science, Mental and Moral Science, was carried by 137 votes against 34. An amendment, proposed by Mr. C. Cannon, of Trinity College, and seconded by Mr. Bourne, provided that the supervision of the candidates for Research Degrees should be vested in the Boards of Faculties, instead of in a special Delegation as proposed by the Statute under consideration. This amendment was carried by 110 votes against 49. Another amendment, by Prof. Holland, which proposed that candidates for Research Degrees, not being already Graduates of the University, should have obtained a degree in some other University, was rejected by 107 votes

against 39. The other amendments were either consequential on those already mentioned, or were of a formal character. The further consideration of the amendments was fixed for Thursday, February 21.

CAMBRIDGE.—The Sedgwick Prize in Geology has been awarded to Mr. Henry Woods, of St. John's College, Demonstrator in Palæontology. The subject proposed for the prize of 1898 is "The Glacial Deposits of East Anglia." The essays are to be sent to the Registry by October 1, 1897. Candidates must be Graduates of the University who have resided sixty days during the preceding twelve months.

Mr. M. Laurie, of King's College, has been appointed by the Special Board for Biology and Geology, to occupy the University's table in the Naples Zoological Station, for three months from March 1.

A course of lectures in Anthropology, with practical work, is announced by Prof. Macalister for the Lent and Easter Terms. The lecturer is Prof. A. C. Haddon, of the Royal College of Science, Dublin. The subject of the first lecture, on February 14, at 3.30, is "The Methods of Anthropology."

The degree of Sc.D. *honoris causa* is to be conferred on Sir William MacGregor, Administrator of British New Guinea, in recognition of his able contributions to anthropology and ethnography.

The following appointments of electors to Professorships in Natural Science and Medicine are announced. Chemistry, Dr. T. E. Thorpe; Plumian of Astronomy, Dr. A. R. Forsyth, and Mr. W. H. M. Christie, Astronomer Royal; Anatomy, Dr. Allbutt; Botany, Mr. A. Sedgwick; Geology, Prof. Newton; Jacksonian of Natural Philosophy, Lord Rayleigh; Downing of Medicine, Dr. A. Macalister; Mineralogy, Prof. J. J. Thomson; Zoology, Dr. D. Macalister; Cavendish of Physics, Lord Rayleigh; Mechanism, Prof. Osborne Reynolds; Physiology, Mr. J. N. Langley; Surgery, Dr. A. Macalister; Pathology, Dr. Maskell.

A grant of £50 from the Worts Travelling Scholars Fund has been made to Mr. P. Lake, of St. John's College, for the purpose of investigating the distribution of Trilobites in Russia and Sweden.

A PARLIAMENTARY PAPER dealing with the moneys received by the Councils of Counties and County Boroughs in England and Wales under the Local Taxation (Customs and Excise) Act, 1890, and available for technical education, has just been published. The following summary shows how the moneys have been expended:—

	Counties (other than London) and County Boroughs.	County of London.	Total.
Aggregate amount received up to March 31, 1894 ...	2,439,319	687,034	3,126,353
Aggregate amount expended on—			
(a) Technical and Intermediate Education ...	1,481,712	27,246	1,508,958
(b) Purposes other than Technical and Intermediate Education ...	290,508	600,034	890,542
Aggregate amount appropriated to Technical and Intermediate Education, but remaining unexpended at the date of the Returns ...	635,933	59,754	695,687
Residue not appropriated for Technical and Intermediate Education, but remaining unexpended at the date of the Returns ...	131,166	—	31,166
	2,439,319	687,034	3,126,353

¹ £6700 of this amount had been appropriated to County buildings and museum.