

SCIENCE.

FRIDAY, MAY 13, 1887.

COMMENT AND CRITICISM.

PROFESSOR ADAMS'S recent monograph on 'The college of William and Mary,' published by the bureau of education, is a valuable contribution to the history of the higher education in the south. Founded in 1693 by royal grant, this college is the oldest in the south, and, with the exception of Harvard, the oldest in America. This venerable institution has fallen upon evil days. During the civil war, nearly all of its property was destroyed, and the greater part of its endowment was lost. The college which gave Washington his degree of civil engineer, and to which, as chancellor, he gave his last public service; the college where Jefferson, Monroe, Randolph, Marshall, and other early fathers of our republic, were educated, — is now closed. Of its former faculty, only President Ewell remains; and we are told that at the beginning of each academic year he rings the college-bell, as a reminder that the institution still lives. Repeated efforts have been made by friends north and south, notably by Senator Hoar, to have congress reimburse the college for the destruction of its property during the war, but without success.

While we can join in the wish that the good old college may again see prosperous days, and commend highly Professor Adams's diligent search for the facts in the history of such an institution, we cannot too strongly condemn his suggestion that a civil academy for instruction, at public cost, in higher political education, is one of the needs of the hour. The land is dotted now with colleges of higher or lower degree, in which any young man may obtain all the instruction necessary, if he but have the necessary grit. The formation of a national school of paid students is by no means necessary, that we should have a supply of capable civil servants. It may be well enough for the government to support those men who are willing to fit themselves for the army and navy, which training may unfit them for civil pursuits: we cannot have modern soldiers and sailors in any other way. But in civil life we are in sore

No. 223 — 1887.

need of men who can understand the homely proverbs of Poor Richard, and who will not be misled into joining any anti-poverty society. Such men can get a school-training which they will make tell, from any village school, and will not ask the government for alms that they may the later live from the public purse. While a good clerk might be turned out by such a civil academy, may we always be able to throw the real burdens of government on the shoulders of those who have learned to carry their own weight.

AT A RECENT MEETING of the Engineers' club of Philadelphia, Mr. Edwin Ludlow spoke of a much-needed invention to facilitate the preparation of anthracite coal without injury to health. While engineering ability and mechanical skill have done wonders during the last decade toward putting the mining and preparation of coal on a scientific basis, making it possible to ship as high as twenty-six hundred tons of prepared coal from one breaker in a single day, still in every breaker, no matter how modern it may be, one will find the chutes, through which the coal passes from the screens to the loading-pockets, lined with boys from twelve to fourteen years of age, who sit there ten hours a day, picking by hand the slate from the coal as it passes along. The atmosphere of this screen-room is, in many cases, so laden with fine coal-dust that objects cannot be distinguished twenty feet away; and, while the breathing of this coal-dust does not seem to have any immediate effect on the boys' health, it undoubtedly lays the seeds for the bane of the coal-region, — miners' consumption. It strikes every thoughtful man, who looks down on from one hundred to two hundred boys working in a single breaker, that it is a very crude and expensive way of preparing coal.

We learn from Mr. Ludlow that various appliances have been designed, but that the only really successful one, as proved by actual experience, has been the water-jig. This undoubtedly removes the slate with a small percentage of waste of coal; and where the product of the

mine is wet, and water has to be used on the screens to effect a separation of the dirt from the coal, it is the best and most economical appliance that can be employed. But the greater part of the coal going to market comes from dry mines, where it would be a detriment to the quality of the coal, and a great expense, to use water. The waste water from the jig is also expensive to take care of, as in most localities it is no longer allowable to let it run, with the fine dirt it holds in solution, into the nearest creek, as the sediment will carry a long distance, and deposits itself where it will do harm, and entail a suit for damages. Enough tanks have therefore to be provided to allow all the waste water to thoroughly settle, so that the water and culm can be removed separately. Water itself, or rather the pure article, is both scarce and expensive during a part of each year throughout nearly the whole region. And if mine water is used, as is generally the case, the acid contained in it attacks the iron work of the jig, and makes frequent repairs necessary.

The principle the jig works on is based on the difference in specific gravity between coal and slate. The two enter the bottom of the jig together, and, by the pulsations of a large plunger in an adjoining compartment, water is forced up through the coal, lifting it, and allowing a fresh supply to come in. The coal is forced to the top and runs off with the water, while the slate, owing to its greater specific gravity, passes out through a separate opening in the bottom. What is needed, in Mr. Ludlow's opinion, is a dry jig, in which this separation will be effected by the use of air instead of water. One of the difficulties encountered in getting up such a jig is caused by the care with which coal has to be handled to prevent its chipping or breaking. It cannot be dropped on iron, or wire, or itself, without producing an appreciable percentage of waste. With the most approved rolls, the loss in rebreaking any size to a smaller one amounts to from ten to fifteen per cent. While the difference in specific gravity between coal and slate of the same-sized pieces is very great, still trouble would be experienced in any separation by an air-current with flat pieces of both slate and coal, on which the action of the air would vary, according as it acted on the edge or the whole side. The man who invents a successful dry jig, that will stand the test of actual trial, will un-

doubtedly make a very handsome thing by it. Not to be too cumbersome, a single jig should not have a greater capacity than five hundred tons per day; and, as the shipping capacity of the anthracite region is about two hundred thousand tons per day, it would take about four hundred to supply the trade.

PROFESSOR VAUGHAN OF MICHIGAN UNIVERSITY has been engaged in the study of the chemistry of tyrotoxinon, the principle discovered by him in poisonous cheese, and which he believes to have been responsible for a number of cases of poison due to ice-cream. Professor Vaughan concludes from his studies that tyrotoxinon and diazobenzol are identical. To a large cat a small bit of diazobenzol nitrate was given, dissolved in water. In a few minutes the animal began retching, and in three-quarters of an hour it vomited freely, and later was purged. The stomach, when opened, was found to contain a frothy fluid, and its mucous membrane was blanched. Thus, not only were the symptoms identical with those of tyrotoxinon, but the post-mortem appearance was the same as that observed in cats poisoned with tyrotoxinon obtained from cheese, milk, and ice-cream. From some oysters which poisoned nearly seventy people in Michigan lately, Professor Vaughan obtained the tests for diazobenzol. The symptoms produced by the oysters were identical with those observed after eating poisonous cheese, ice-cream, and milk. It is altogether likely that the active agent in all those foods which when partly putrid produce the same group of symptoms, is diazobenzol, probably combined with different acids. Professor Vaughan is now experimenting with the hope of ascertaining the nature of the micro-organism which produces this poison, but is not yet ready to make any definite report. It seems to be a germ which develops best in the absence of air, or with only a limited supply of air.

WE ARE NOW APPROACHING the season when the attention of teachers and pupils alike is turned toward the important matter of examinations. Review-work is begun, and there is a general arranging and polishing-up of knowledge in anticipation of the annual test. Since examinations play so important a part in our educational institutions from primary school to college, it is fitting that they should be the subjects of special thought and attention. For this reason we print

this week the instructive paper of Mr. Carr, and shall follow it shortly with a discussion on the function and conduct of examinations, to be participated in by well-known educators. The formulation of some test of knowledge that will avoid in as large a measure as possible the evil practice of 'cramming' is what is wanted. In this matter perhaps the schools might take a leaf out of the experience of the universities, and make the passing or not of an examination depend largely upon some original work which shall involve the principles sought to be conveyed in the class-room instruction. The system of marking we believe to be unsound in theory, and vicious in practice; and to its operations we ascribe many of the ill effects now observed to follow from competitive examinations. But the subject is a large one, and we commend it to the careful thought of our readers.

PROFESSOR JOWETT OF OXFORD, than whom no Englishman is better known for his interest and activity in educational matters, is a strenuous advocate of state aid to education; and that, too, not in the direction of elementary education alone, as is proposed in this country, but in the form of direct subventions to the so-called university colleges. Ten such colleges now exist in England, seven of them having been founded during the past decade. If two or three more are added, then provision will have been made for all the cities having over one hundred thousand inhabitants. The cost of the education in these colleges is about twelve pounds annually, — a sum not only greater than the students can afford to pay, but a good deal less than will suffice to keep the institutions in their present state of efficiency. "The financial prospect of these colleges," says Dr. Jowett, "is therefore the reverse of hopeful. It is practically impossible to support them by voluntary subscriptions. They do not appeal to the humane or religious feelings of mankind, like hospitals or churches; and there are many who think that the ambition of the poorer classes to have a better education ought not to be encouraged." Dr. Jowett touches on the many and varied benefits conferred by these university colleges not only on the places in which they are situated, but on the country at large, and urges that the sum asked for from the state is not large, and that it would be given to those who have done all they can to help themselves, that it might be proportioned to subscriptions raised in the various local-

ities, and that no new principle is involved. "No principle of political economy forbids the application of public money to the education of those who cannot afford to educate themselves. Such an expenditure is really one of the best affairs of business in which a nation can engage." There is some prospect, we understand, of Dr. Jowett's plea being effective, at least in some degree.

AN INTERESTING ARTICLE on 'Realistic and dramatic methods in teaching geography,' by William Jolly, appears in the March and April numbers of the *Scottish geographical magazine*. The author urges that the mechanical method of teaching now in general use be abandoned, and that 'things should be taught, not words.' He thinks that in the initiatory stages the use of the text-book should be entirely dispensed with, and that all teaching should be based on the use of the map and of models. For showing the elementary features of the earth's surface, he would use models, — water poured on a table, to show the relations between land and water, and clay or sand to show the phenomena of relief. He would then proceed to explain the use of the map. We are of the opinion, that, as far as possible, the natural phenomena of the country should be made use of for illustrative purposes, as models frequently give rise to ideas as incorrect as those produced by mere description. Good pictures, even, might be found more serviceable than clay and sand. Mr. Jolly emphasizes the necessity of thoroughly teaching the use and meaning of maps as showing the geographical phenomena of a country, as well as the usefulness of illustrating these phenomena by means of pictures and collections from different countries. This method has been adopted in many schools of Germany and Switzerland. We notice in the latest issue of the *Journal of the Aarau geographical-commercial society*, that this system is being supported by the Swiss geographical society. The Aarau society has arranged a collection of photographs, products, etc., of different countries, and sends it to the schools of Switzerland by turns, for use in geographical instruction. The St. Gallen society has recently resolved to take part in this enterprise, and has arranged a similar collection for circulation in the schools of eastern Switzerland. The principal difficulty in teaching the use of the atlas, and of making it the basis of geographical instruction, is the lack of a uniform atlas. This question was discussed by

the German Geographentag on April 17. After a long discussion, it was decided that the use of different atlases in one class was detrimental to the success of the teaching of geography, it preventing a thorough explanation of the meaning of the map, the material contained in the maps being too different in different atlases.

THE REPORTS OF THE SONORA earthquake are still very incomplete. As far as can be seen from the meagre notes published in the daily papers, the Sierra Madre, which forms the boundary between the states of Sonora and Chihuahua, was the centre of activity. The towns and villages on the Rio de Batepito on its western side, and those on the Rio Corralitos on its eastern side, suffered most severely. In the former valley, reports of loss of property and life come from Oposura (Moctozuma) on the Rio de Soyopa and Babiose. There are, however, two places of that name, — one on the Rio de Batepito, one in the Sierra Madre. On the east side Corralitos and Cases Grandes suffered severely. As the district lies midway between the Sonora and Mexican railways, news travels slowly, and the reports are much retarded. The first shock occurred on May 3, and was followed by other violent tremors, the latest reported being on May 8. The accounts of volcanic eruptions are very doubtful, as it seems that the steam from hot-springs and the smoke of forest-fires have been mistaken for eruptions. There are three lines of volcanoes in this district, — the New Mexican line of extinct volcanoes; the line of California, which meets the former at the head of the Gulf of California; and the Mexican line, which runs from Orizaba to the Revilla Gigedo Islands. It contains several active volcanoes. There are no signs of disturbances of any of these volcanoes during the earthquake, while one report refers to an eruption near the boundary of Guatemala. The shocks were felt in southern Arizona, New Mexico, and Texas, but not so strongly as in Sonora.

THE EXPLORATION OF THE ANTARCTIC REGIONS.

DURING a period when explorations were most vigorously carried on in all other parts of the world, the antarctic region remained as unknown as it had been for a long time. Since Cook, by his voyages, had proved the non-existence of an extensive Terra Australis, which former geographers supposed to occupy a great part of the southern

hemisphere, nothing worth mentioning was done until the beginning of the present century. After peace had returned to Europe, which had been shaken by revolutions and wars, polar explorations were resumed: Parry, Ross, Lyon, Scoresby, and Franklin enlarged our knowledge of the arctic regions; while Bellingshausen, Biscoe, Balleny, Wilkes, Dumont D'Urville, and James Ross explored the antarctic seas. But this period of lively activity in the southern hemisphere did not extend over more than twenty-five years, from 1819 to 1843. After that time the enthusiasm for arctic travel reached its highest pitch in the numerous attempts to rescue Franklin or to ascertain the fate of his unfortunate expedition; but the antarctic seas have never been visited again, and our knowledge has not been increased since the period mentioned.

It was not until quite recently that new efforts were made to revive the interest in antarctic exploration. Maury tried to organize an expedition, but it was in vain: he was unable to find any support, either in England or in America. The revival of interest is chiefly due to the efforts of G. Neumayer of Hamburg, whose frequent and energetic appeals had the effect of arousing many societies from their inactivity, and of awakening a new interest in the problems of antarctic geography. It was in 1861, when Neumayer was director of the observatory of Melbourne, that he tried to work for renewed explorations in those regions. Since that time he has continued to do so with unabating perseverance, and his frequent addresses and writings on the subject have principally created the present interest in antarctic exploration. In 1885 the German Geographentag discussed the subject very fully, and expressed itself in favor of renewed explorations in the antarctic regions. In the same year Admiral E. Ommanney brought the matter before the geographical section of the British association, and a committee was appointed, which reported favorably on the matter. This example was followed by the Scottish geographical society and the Royal society of Edinburgh. Later on, the Royal society of Victoria discussed the subject, and issued a report, in which they express the willingness of the Australasian colonies to render assistance to an imperial expedition if decided on, and the intention of the committee, meantime, to arrange for the despatch to the antarctic regions of a steam-whaler, with a small staff of observers, for the purpose of discovering some safe winter harbor for the projected expedition. The latest news is that Nordenskjöld proposes an expedition which is to last eighteen months.

At this moment, when we may hope that the