SCIENCE.

FRIDAY, MARCH 19, 1886.

COMMENT AND CRITICISM.

'THE GEOLOGY of the Pittsburgh coal-region' is the title of an interesting paper, recently published, by Professor Lesley. The amount of coal in the Pittsburgh region is estimated at about thirty billion tons, — an amount practically inexhaustible, at least for centuries. During 1884, eleven million tons were taken from the Pittsburgh bed, — an output of about sixty per cent of the whole bituminous coal-production of the state, and about thirty-three per cent of the shipments of anthracite. Concerning oil and gas, however, the author has very different views. He says, "I take the opportunity to express my opinion in the strongest terms, that the amazing exhibition of oil and gas which has characterized the last twenty years, and will probably characterize the next ten or twenty years, is nevertheless, not only geologically but historically, a temporary and vanishing phenomenon — one which young men will live to see come to its natural end. And this opinion I do not entertain in any loose or unreasonable form; it is the result of both an active and a thoughtful acquaintance with the subject."

THE CORNELL UNIVERSITY REGISTER for 1885–86, which has just appeared, shows an institution in a high state of efficiency. There are upwards of 60 professors, assistants, instructors, and similar officers, and 638 students. Of this number, 604 are undergraduates; and the marked difference in numbers between the upper and lower classes may be taken as evidence of the rapidly increasing popularity and efficiency of the university. As against 84 seniors and 97 juniors, there are 162 sophomores and 239 freshmen. The former figures are those of Amherst, Williams, and Brown, while the latter are not far away from those of Harvard. That this magnificent increase is due to a liberal policy and the judicious use of a large endowment, cannot for a moment be doubted; but it seems strange to find in this great university so important a department as that of political economy represented by an associate professor only, and the whole instruction in philosophy devolving upon one man. We are aware that Professor Schumann has been called to this department at Cornell, and will begin his work next autumn; but at that time Professor Wilson will, we understand, retire from active duty, and philosophy will yet have but a single representative. The rapidly widening provinces of psychology and ethics have long since made it impossible for a man who must also teach the history of philosophy and logic to keep up with their progress; and it is strange that so few of our great colleges seem to recognize this fact. Harvard and Princeton seem to us the only two colleges in which the philosophical encyclopaedia is at all adequately represented.

BOTANICAL INSTRUCTION IN THIS COUNTRY.

BY a slow evolutionary process, botanical instruction appears to be undergoing a radical change in the United States, which concerns both its nature and methods. Whereas only a few years ago botany, as a college study, dealt chiefly with the flowering plants and vascular cryptogams, its scope has broadened, even in the limited undergraduate curriculum, so that the graduate of to-day is supposed to have been taught more or less about each of the principal groups of plants, from the lowest to the highest, if he has studied botany at all. With this change has come an earnest effort to make his knowledge a working-knowledge, obtained in the laboratory so far as essentials are concerned, and merely rounded out in the lecture-room. That Harvard university should be prominent in planning and introducing these changes is not surprising, for nowhere has botanical research and instruction been so favored in the possession of the necessary means and of talented leaders in different branches of the growing subject.

A good library and herbarium form an admirable basis for much systematic work and for a certain class of instruction, but they must needs be supplemented by a garden and museum if the latter is to meet the modern requirements. Botanical gardens are established either to aid in the introduction of valuable economic plants, or as

means of education. Several of the largest gardens owe their origin primarily to the first cause, though they have proved valuable educational agents, and may ultimately have come to be used chiefly for instruction and research; but a considerable number are the property of colleges, and were from the first intended to subserve educational ends. The garden at Cambridge is of this class; and the report of its director, just published, shows that it is growing in usefulness. Beside the general collection of plants that every well-regulated garden is supposed to contain, the Cambridge garden is working toward extensive special collections to illustrate economic botany and the general morphology of phenogams. The groups in the latter, which can well be copied on a smaller scale, even where the name of 'botanic garden' would appear pretentious, are arranged in substantially the order laid down in the common text-books of botany, so that the different forms of leaves, flower-clusters, and flowers, can be easily recognized by any pupil. In connection with the economic plants — intended to exhibit variation under domestication by large suites of varieties of such plants as the cabbage, etc., and to promote the cultivation of vegetables that have come to be prized in Europe, though strangers to our tables — should be mentioned the large economic collection of trees in the Arnold arboretum at Jamiaca Plain, which is now reported by its director, Dr. Sargent, to be definitely planned so as to include a general collection of the native trees of eastern Massachusetts, and the most valuable species from other localities, planted singly, to admit of the maximum growth of each species, and also in groups, chosen so as to represent its main varieties, and calculated to show its mass-characters. This loosely planted general collection, arranged for the definite purpose of object-teaching, is supplemented by a more compact experimental and working collection, intended to supply material for study, and especially to receive doubtfully hardy or valuable species and transitory horticultural forms.

While Harvard — the oldest and strongest botanical centre of the country — is thus giving evidence of large resources and progressive intelligence, the fact that similar steps are taking in other sections of the country is not to be overlooked, and is even more indicative of progress, since it implies a wide-spread interest in better instruction and better research in botany. It is very desirable that this feeling may become more prevalent, and receive the financial backing that is necessary if it is to count for much.

So far as experimental work is concerned, persons who know that there is a botanic garden at Washington, enjoying the patronage of the government, might expect much from it, did not the majority of them know, at the same time, that it is so circumstanced as to improve its past record very little until the policy of its management is radically changed. Until then, such work must be done elsewhere; and it is being undertaken by the experiment-stations and agricultural colleges of several states enthusiastically, if, in most cases, with too limited resources. Meantime new gardens are being established and developed under hopeful auspices. The most prominent of these are the newly created Montreal garden, and the private garden of Mr. Henry Shaw of St. Louis, which has recently been placed in relation with the chair of botany of Washington university, and will, it is understood, be so amply endowed by its founder as to become within a few years, if properly developed, a leading centre for research, experiment, and instruction in pure and applied botany.

That these movements indicate a growing recognition of the needs of botany and a disposition to meet them, is suggested by rumors of similar steps soon to be taken in other quarters; so that the outlook for botanical and horticultural work of a high grade is more promising than at any time in the past. What is most to be feared, is that ill-advised influence may place the facilities for this work in incompetent hands, with the result not only of temporary delay, but of permanent disaster. This danger can be avoided only by proper care in the first instance, both in selecting men and in planning work.

DEEP-SEA SOUNDINGS IN THE SOUTH PACIFIC.

The navy department has received a letter from Commander A. S. Barker, U.S.N., dated Dec. 18, 1885, at Sandy Point, Magellan Straits, in which he reports having made a series of deep-sea soundings from Wellington, New Zealand, across the South Pacific to the Straits of Magellan. Fifty-seven casts were taken during the passage, from Nov. 6 to Dec. 16, over a distance of forty-five hundred nautical miles. The passage was made across that part of the ocean where strong westerly winds prevail, and many of the soundings were taken under trying circumstances. A few gales were encountered, but only one severe