properties from the rest of the coal that by the roughest chemical treatment the remainder of the coal can be broken down while the spore-coats and cuticles are left little altered. They are then seen under the microscope to differ in structure little, if at all, from their condition in a living plant. Their obvious relative indestructibility has resulted in their accumulation in the coal in quantities much in excess of their natural proportion—in extreme cases, even to the total exclusion of other materials.

Associated with the cuticles and spores in respect of chemical peculiarities and durability, but differing somewhat in the manner of distribution in the coal, are the resinous secretions of the plants. Since the resins were originally contained in the wood or bark, they are found largely in the vitrinite of the coal. On the other hand, they are often found in local aggregations among the more disintegrated plant debris, in such a manner as to suggest that the aggregates may represent the resinous content of a tissue which has, for the rest, been almost entirely destroyed.

There is one other distinctive ingredient in most ordinary coal seams, characterised by its minute state of fragmentation. It forms a kind of paste made up of particles of 1 or 2 microns or less in diameter. Obviously it represents quite a distinct stage in the degradation of the plant material; and there is some indication that it has distinctive chemical peculiarities. It is of very dense colour, and is consequently opaque except in the thinnest sections. It is essentially characteristic of the dull coals. So far it lacks a generally recognised title and has been merely described as the 'residuum'. Dr. Stopes would christen it 'micronite'.

'Sapropelic Coals'

The foregoing account of the components of coal deals with those to be found in our normal bituminous coals of Carboniferous age. So far as my knowledge extends, the account does not require material modification in reference to the coals or lignites of other ages. But there are other types of coal, particularly the cannels and bogheads, which have a widely different structure and at least one very different component material; namely, the microscopic oil-bearing algæ. In the last few years these organisms have been carefully re-examined by Zalessky, by Thiessen, by P. Bertrand, and by my own colleague Dr. Temperley, who have not only demonstrated their structure in greater detail, but also have established their essential similarity (and possible identity) with the living oil-alga *Botryococcus braunii*. This constituent of the cannels affords the most striking of all examples of the effect of original materials on the composition of the coals. As the algal content increases, so the percentage of hydrogen in the coal rises, from about 6·0 per cent in those without algæ up to more than 12 per cent in the purest algal bogheads.

(To be continued.)

Birkbeck College

Past, Present and Future

THE successful inauguration of the appeal for the rebuilding of Birkbeck College, originally the London Mechanics Institution (see NATURE, Nov. 16, p. 787), will be welcomed universally by students of science. The College, established at a meeting of 'mechanics' held in the Crown and Anchor Tavern in the Strand on December 2, 1823, had as its original purpose to provide scientific education for the skilled craftsmen who were the aristocracy of the Industrial Revolution. That the objective was education and not mere technical training is proved by the motto of the Mechanics Institutes established throughout the country: "To make a man a better mechanic we must make the mechanic a better man".

In the early days, as Mr. Ramsay MacDonald, a former student of the College, has said, their science was simple and stimulating. "Its revelations were both startling and fresh; the controversies it roused were popular and the prospects it opened were inspiring." The opposition encountered by Birkbeck was essentially opposition to scientific training. "What is wanted," said Bell's *Weekly Messenger*, "is practical mechanics—instruction in trades . . . Science, in the very nature of things, must be confined to a few"; and the *St. James' Chronicle* asserted that "a scheme more completely adapted for the destruction of this empire could not have been invented by the author of evil himself. . .". Carlyle, in "Sartor Resartus", denounced its students as "professed Enemies of Wonder", cackling "like true Old-Roman geese and goslings round their Capitol, on any alarm, or on none"; as illuminated sceptics guiding people with rattle and lantern when the sun is shining. He resented "that progress of Science which is to destroy mystery".

Science has withstood these attacks and has captured some of the strongholds of the older culture. Birkbeck College can claim to have acted as *éclaireur* to the "march of mind" and to recapitulate the history of scientific instruction in Great Britain; this proud claim should ensure the success of its appeal.

The College, as we have said, stands for education in a broad sense, but it stands also for another great principle—part-time education. Hundreds of examples of the value of part-time education could be cited from the records of the College, but the one selected by the Archbishop of Canterbury in his speech at the Mansion House meeting is of outstanding interest. Sidney Gilchrist Thomas (1850–85), a police court clerk, attended George Chaloner's chemistry class in the College. The lecturer remarked that "the man who eliminates phosphorus by means of the Bessemer converter will make his fortune". From 1860 onwards, Sir Henry Bessemer and many others had studied this problem, a problem of great economic importance, since its solution would render available vast deposits of iron ore in England, Germany and the United States. Gilchrist Thomas solved the problem and received the promised guerdon. This wealth was not, however, the incentive to the discovery, for his biographer states that "he held 'advanced' political and social views and had he lived he had intended to devote his fortune to the alleviation of the lives of the workers". The money was spent in philanthropic objects after his early death. "A rare young man", as Gladstone observed! Let it be added that the scientific equipment provided at the College at this period was of the simplest. The room, said Bernard H. Becker in "Scientific London" (1874), might (were it not devoted to the use of science) be designated the back kitchen. A couple of glaring 'butcher's lights' illuminated a rough deal table from behind which Mr. Chaloner expounded the properties of carbonic acid gas. But he added, —and this sounds the keynote of the history of the College—"the lecturer and the audience evidently mean business".

In recent years, the College has catered for two groups of students who are to be found in large numbers in London and the surrounding districts. The first consists largely of teachers, civil servants, technical chemists and others who have missed the usual university training and are willing to give their evenings to working for a degree. The second group comprises graduates in arts and science of London and other universities who have a keen desire to pursue post-graduate studies and research. For many years the lecture rooms and laboratories have been seriously overcrowded by both types, and each year a number of keen and deserving students has been refused admission owing to limitations of space.

New buildings and more space are urgently needed to enable the College to serve effectively the needs of the present generation. When the College was founded in 1823, two men in every three and nine women in every ten could neither read nor write. When it was rebuilt in 1883, elementary education was in its infancy. To-day the mesh of the scholarship net is so fine that the time is not far distant when all who are fitted for university education will be provided for in the ordinary course.

What then is Birkbeck's future? It has provided adult education in fundamental subjects; it has led its students along the paths of the polytechnic, and inspired them to scale the academic heights by degrees—now it has entered upon a greater role —the provision of opportunities for research for those whose everyday occupations are in other fields.

Schmidt and the Eels

Danish Eel Investigations during Twenty-five Years

ON June 22, sixty miles west of Ringkjöbing, Jutland, the research ship *Dana*, built by the British Admiralty during the War and sold to the Danish Government in 1921, was sunk in collision with a German trawler in a fog. Happily there was no loss of life; but, with her, was lost all her scientific equipment and the material of her latest cruises. Johannes Schmidt, who made the *Dana* famous, had died all too soon, a comparatively young man, on February 21, 1933. When his ship went down, it was as if a chapter of oceanographical history came to an end. The little brochure "Danish Eel Investigations During Twenty-five Years, 1905–1930", recently issued by the Carlsberg Foundation, Copenhagen, may be regarded as the epilogue to the story.

There is nothing new in this publication. The text is taken from Schmidt's report of his famous voyage round the world. It was his intention that the report, written in Danish, should be done into