That Prof. McAlpine has made a definite and valuable contribution to our knowledge of this pathological problem will appear presently, but this is only an added reason why he would have done well to make it perfectly clear that the main problem still remains to be resolved. To conclude that the "immediate cause" of the disease is "the concentration of the cell sap" (p. 75) is not to discover a cause, but to use words the meaning of which is at least as obscure as the nature of bitter pit. Moreover, if quick-acting nitrogenous manures, which lead to sappy growth, encourage bitter pit, how may that disease be attributed to concentration of sap?

Perhaps the most valuable part of Prof. McAlpine's studies is that which demonstrates the possibility of preventing the outbreak of bitter pit in cold-stored apples. As the result of experiment, he shows that if apples be stored at a temperature of about 30° or 32° F., and if fluctuations beyond these limits be prevented, no bitter pit manifests itself during a period sufficiently prolonged to transport the fruit from Australia to Europe. This is a great gain, and the practical results accruing from it should not only pay for the cost of this elaborate investigation, but encourage the Commonwealth to promote further investigations into the origin of the disease.

A point of some interest on the scientific side of the problem is the fact that starch persists in the broken-down tissue of the pitted region of the apple pulp, whence it is concluded that the incipient but invisible stage of the disease occurs in the pre-ripening phase, or at all events during the phase in which starch gives place to sugar. This is plausible, but the opposite view is not precluded that the starch of the bitter pit arises as a result of a reconversion of sugar. In favour, however, of the view that bitter pit develops, although it is not apparent, at an early stage is the evidence obtained by subjecting suspected apples to X-rays, as a result of which it is claimed, and the claim is supported by photographs, that prospective pit areas appear on the radiographs.

Prof. McAlpine is hopeful that the loss due to bitter pit may be ultimately prevented by breeding pit-resistant varieties. It is a work worth undertaking, but nevertheless is not to be undertaken lightly, for it may prove a long business.

F. K.

GEOLOGY AT THE BRITISH ASSOCIATION.

THE president, Prof. W. S. Boulton, delivered his address on Wednesday, September 6, to a good audience, and was followed by Prof. G. A. Lebour who described the general geology of the rocks round Newcastle.

The Permian formation, which forms such a large part of the surface geology in the neighbourhood, received special treatment at the hands of Dr. D. Woolacott, who has made it a detailed study, and brought order out of the complicated bedding He shows that the Middle Permian Beds consist of a fossiliferous, unbedded reef formation, which ran parallel to the coast of the Permian sea, and on each side of which are well-stratified, unfossiliferous limestones, which were formed in waters permeated with calcium sulphate, which afterwards formed gypsum beds. The concretionary formations found in the various beds were lucidly dealt with.

During the meeting Dr. Woolacott took the geologists to see several typical sections of the Permian beds, and exhibited interesting evidence in proof of his contentions.

The important questions of the underground mapping of prominent coal seams were dealt with by Mr. Wickham King in his plexographic model of the South Staffordshire thick seam, by Dr. G. Hickling in diagrams of the Black Mine coal of Lancashire, and by Prof. W. G. Fearnsides in maps of the Barnsley Bed.

In the afternoon a special joint meeting with Section K was held to receive the report of the Research Committee appointed to investigate the Old Red Sandstone of Rhynie, Aberdeenshire, and to hear a paper by Dr. R. Kidston and Prof. W. H. Lang describing the very interesting fossil remains found in that deposit. The present paper dealt only with one of these, *Rhynia gwynne-vaughani*, which is the oldest known peat. The plants, which were rootless and leafless, and grew crowded together, consisted entirely of a system of cylindrical stems, attaining a height of 8 in. or more, and ranging in diameter from 1 to 6 mm. The stems bore small hemispherical projections, from some of which lateral branches were developed. The aerial stems had a thick-walled epidermis with stomata, a cortex, and a simple central cylinder. Large cylindrical sporangia, containing numerous spores, were found in the peat. They were evidently borne terminally on some of the leafless aerial stems.

On Thursday there was an important joint discussion with the members of Section B, which dealt with the investigation of the constitution and classification of coal. A combined geological and chemical study was recognised by all speakers as an essential to success. There was also general agreement as to the need for more systematic and careful selection of samples, for the separate investigation of the various constituent elements of seams, and for the microscopic examination of the specimens analysed. The great national importance of the work was also emphasised. The discussion was opened by Prof. G. A. Lebour, followed by Prof. W. A. Bone, Prof. P. F. Kendall, Prof. P. P. Bedson, Dr. J. T. Dunn, Mr. D. Trevor Jones, Dr. Marie C. Stopes, Dr. G. Hickling, Prof. W. G. Fearnsides, and Prof. W. Boyd Dawkins.

At the close of the discussion Dr. J. W. Evans gave a suggestive description of a method of representing geological formations and structures in black and white on maps. Mr. Leonard Hawkes described the Tertiary acid volcanic rocks of Iceland. In places this acid series is at least 2000 ft. in thickness, and consists of tuffs, sphæro-like liparites, and obsidians, The eruptions were similar to those of post-Glacial times. The uneroded character of the liparite lavas shows how rapidly the successive basalts which submerged them were poured out. Since the close of the Tertiary volcanic period enormous denudation has obtained, and the varying resistance offered to erosive agents by acid and basic rocks has produced remarkable topographical effects.

Dr. Alexander Scott gave the results of an extensive examination of the Arran pitchstones, describing four groups varying from non-porphyritic glasses with abundant microlites of hornblende, to a more basic type with scarce phenocrysts, but with abundance of pyroxene microlites. An attempt had been made to determine the cooling histories from an examination of the field relations and the microscopic structures of the various types, and also to indicate the conditions which were responsible for such a large development of glassy intrusive rocks.

On Friday a joint meeting was held with Section E, to hear a paper by Dr. Albert Wilmore on the Northern Pennines. The structure of the range and its gaps with the intervening rock-blocks were described. The effects of the fault and fold systems on the scenery were dealt with, and many interesting problems which still leave scope for careful investigation were pointed out.

A paper was contributed by Prof. W. G. Fearnsides and Dr. P. G. H. Boswell on the occurrence of refractory sands and associated materials in hollows in the surface of the Mountain Limestone district of Derbyshire and Staffordshire. Then Dr. P. G. H. Boswell dealt with the geological characters of sands used in glass manufacture, which gave interesting and important glimpses of the new efforts being put forward to supply our present economic necessities. The report of the committee appointed to investigate the flora of the Lower Carboniferous Beds of Gullane described the finding of a petrified flora in 1914, the most important form of which was Pilys. Many examples of this fossil plant were found, some with bark, and one, a branch tip, still clothed with needle-like leaves. These enabled the connection between leaf and stem to be determined, and much light had been thrown on the stem-structure of the genus. The whole assemblage of plant types exhibited a close similarity with the flora of the Pettycur Limestone in Fife. W. L. C.

THE BRITISH ASSOCIATION AT NEWCASTLE.

SECTION F.

ECONOMIC SCIENCE AND STATISTICS.

OPENING ADDRESS (ABRIDGED) BY PROF. A. W. KIRKALDY, M.A., B.LITT., M.COM., PRESIDENT OF THE SECTION.

The Need for National Organisation.

As the war developed there has been a growing tendency to demand organisation in every sphere of national life. The striking successes scored by Germany have been universally, and probably rightly, ascribed to thoroughness of organisation and complete preparedness before provoking the conflict. As a consequence, a comparison has been made between English and German military policy, greatly to the detriment of the former. And, not content with this, further comparisons have been made, with the result that, if one believed all that was printed in the newspapers or accepted what passes in private conversation, we should be led to believe that rule of thumb has been the leading British characteristic. It has been forgotten that Germany has for many decades prided herself on her Army, even as England has relied on her Navy. One has been a great military Power; the other equally great at sea. The test of war has proved that Germany was a very difficult country to oppose by land, but that in naval matters England is supreme. The economist, however, has to go further and investigate into those matters which are connected with his science—namely, the production, the distribution, and the consumption of wealth. Can it be said that the want of organisation and other faults of our military system are typical of what has been going on in the industrial and commercial sphere? I for one cannot bring myself to accept the truth of this. Had our economic interests been carried on under so-called War Office principles we could not have built up the great position we occupy as world traders. What, then, are the facts? To answer this question one should remember the leading facts connected with our industrial development. This brings out some points which the superficial observer inevitably misses. For upwards of a century our industries have been gradually developing, and the progress has on the whole been along healthy lines—each decade has seen some advance more or less great.

German attention to industry and commerce is much more recent. She was able to benefit by our experience, nor was she slow in doing so. The agitation for Tariff Reform and Colonial Preferences is a proof that several years before the war broke out some Englishmen were awake to the fact that a new condition had come into existence, and that, if we were to preserve our advantageous position, we must take careful stock of newly arisen factors in world-trade. For Germany was not the only one, nor perhaps the most serious, of these factors. The United States of America, from the time of the Civil War, had bent her energies to the work of internal development. Having concentrated on this for nearly forty years, she began to expand a world-policy, both political and commercial. Japan, too, emerged with unexpected suddenness into the arena. Thus, as the nineteenth century drew to a close, the economic interests of England required careful and earnest attention. The fiscal controversy undoubtedly had the great and important effect of waking English traders out of the lotus-eating condition into which they were in danger of sinking. All our principal, and many of our less important, industries were carefully reviewed, with results that can be realised by a study of the annual statistics published by the Board of Trade. There was, however, a very subtle policy being pursued, which required very minute knowledge and wide experience to grasp. It was our proud boast that we left trade free and untrammelled, that we believed in the health-giving effects of open competition. It needed the stern lesson of the war to make known how this generous policy could be utilised to our detriment by a rival commercial nation. The facts as to the exploiting of the mineral resources of the Empire, as to how the dye and colour industry and various by-product industries have been developed so that certain vital trades almost passed under foreign control, came to light only just in time.

It became plain, as these facts leaked out, that we needed a better system of industrial and commercial intelligence. There was also a lack of unity of working among our principal industries incompatible with the growing interdependence which has been a marked feature of modern economic life.

Hitherto, apparently, it has been no one's business to survey comprehensively the resources whence our raw materials are drawn. Even those resources within the Empire have been nervelessly left to be exploited by the first-comer, and the mask of an English name has enabled foreign capital and energy to divert some of our valuable minerals to foreign countries, whence we have been compelled to purchase them at unnaturally enhanced prices. Sufficient of the facts have been made public to warrant the demand for reconstruction and improved organisation of those departments responsible for the national trade.

It would be most unwise as well as ungenerous to attempt to blame our Board of Trade. That department has, on the whole, worked hard and well for British interests. But it is both wise and necessary to criticise the policy that has overweighted this one Government department. And although there should be very careful consideration before either recommending or making a drastic change, attention ought to be given to the frequently expressed opinions of both chambers of commerce and individual traders in favour of the creation of a Ministry of Commerce. To this Ministry there might be transferred some of the functions of the Board of Trade, whilst at the same time the new Ministry might be responsible for maintaining that general survey over trade and commerce without which any organisation we may attempt would be incomplete.