



SATURDAY, APRIL 19, 1930.

CONTENTS.

	PAGE
Pipe Lines and Progress	589
An Everflowing Stream. By J. L. M.	591
A Chemical Dictionary. By Prof. C. S. Gibson	593
The Oligochæta. By J. H. A.	594
Our Bookshelf	596
Letters to the Editor :	
The Parachor and Molecular Volume.—Dr. Allan Ferguson	597
Parasitism a Stimulus to Pupation: <i>Alysia manducator</i> in Relation to the Host <i>Lucilia sericata</i> .—F. G. Holdaway and A. C. Evans	598
Penetration of Methylene Blue into Living Cells.—Dr. Matilda Moldenhauer Brooks	599
Photo-Decomposition of Molecules having Diffuse Band Spectra.—Prof. Hugh S. Taylor and John R. Bates	599
Intensities in the Atmospheric Oxygen (Intercombination) Bands.—Dr. W. H. J. Childs and Prof. R. Mecke	599
The Hybridity of <i>Drosophila melanogaster</i> .—C. D. Darlington	600
Raman Effect in Water.—I. Ramakrishna Rao	600
Dipole Moment of some Organic Halides.—D. N. Sen Gupta	600
Earth Movements in the Delta of the Rhone. By R. D. Oldham, F.R.S.	601
Diet and the Teeth	604
Obituary :	
Prof. Augustine Henry. By Prof. E. P. Stebbing	606
Prof. F. V. Theobald. By C. A. W. D.	607
News and Views	608
Our Astronomical Column	613
Research Items	614
High Frequency Fatigue	617
South African Vegetation	617
Weather and Climate of the Sahara	619
University and Educational Intelligence	620
Historic Natural Events	620
Societies and Academies	621
Official Publications Received	623
Diary of Societies	624

Editorial and Publishing Offices:

MACMILLAN & CO., LTD.,

ST. MARTIN'S STREET, LONDON, W.C.2.

Editorial communications should be addressed to the Editor.

Advertisements and business letters to the Publishers.

Telephone Number: GERRARD 8830.

Telegraphic Address: PHUSIS, WESTRAND, LONDON.

No. 3155, Vol. 125]

Pipe Lines and Progress.

SLOWLY but surely the day of the individual, of the private firm, and of the small community is passing or has already passed. The individual has parted with his liberties to the community, rationalisation is putting the private firm out of business, whilst the small town must participate in larger schemes if it is to supply such public utilities as water, gas, and electricity at satisfactory prices. Thus we have a scheme for the national supply of electricity from super-power stations already in being, and there is much talk of the long-distance transmission of gas by trunk lines. These would in the first place serve to interconnect all the existing gas producers in a given area of country, with the result that in time the main load would be supplied from the more economical plants, the others serving as a standby for conditions of peak load. At the same time, the available productive capacity of the whole area would be greater than before, without any additional capital expenditure being required for new plant beyond that of the cost of the trunk lines. All these considerations and advantages closely parallel those which it is hoped to attain in the electrical industry.

It is surprising that a small country like Britain, in which distances are relatively so short, has not taken the lead in these matters: it affords yet another proof, if such be required, of the inborn nature of British individuality. The passage of our kin across the Atlantic, coupled more likely with the necessity for the co-operative spirit in the development of the vast areas of a new and virgin country, has had the effect of making them super-enthusiastic in developing large projects, and the very existence of distances has been seemingly accepted as a challenge to bridge and to make them as naught.

The newest example of this spirit is exemplified in what is happening in regard to natural gas, which, though it can alas have no parallel in Great Britain, is well worth attention and study. The great American oil industry to-day has a capital of two thousand million pounds. It has constructed in the United States some 100,000 miles of pipe line for the gathering and conveyance of the oil from the fields to the refineries and to the coast; the said lines contain at all times a quantity of oil estimated at 18 million barrels of 42 gallons each; they involve a very large annual expense for their maintenance and repair.

At first the natural hydrocarbon gas produced

at the wells was largely wasted ; part of it was burnt near at hand as a source of heat ; part of it converted, by processes which are none too efficient, into carbon black, which is an important ingredient of the rubber tyre.

When the advantages of the gas as an industrial fuel became realised, distance was regarded as no objection in running a pipe line to bring it to a potential large consumer. Already some 60,000 miles of pipe line for natural gas are in existence and a very extensive programme of new construction is in hand. The existing state of affairs is well shown in a large map of the natural gas pipe lines of the United States, which is published by and can be obtained from the Department of Commerce.

As showing the magnitude of the engineering problem involved, and incidentally its beneficial effect on the steel industry, it may be mentioned that in the line from Northern Louisiana to St. Louis, a total of 526 miles of 20-in. and 22-in. high pressure pipe were laid, involving a weight of 115,000 tons of steel. Much greater lengths than this are projected, and natural gas is already beginning to reach the holders and distribution mains of the gas companies in the large cities of the East. The natural gas has a calorific value of some 1000 B.T.U., or roughly twice as high as that normally distributed by the gas industry ; problems therefore arise in regard to its dilution if it is to be burned efficiently in the existing domestic apparatus.

It is claimed that already 75 per cent of the total gas burned in America is natural gas. Questions naturally arise as to the permanence of any one source of supply as the wells become exhausted and the economic wisdom of the large capital sunk in the construction of the pipe : it is the custom to write these off very rapidly. The optimism of the American rises superior to any question of exhaustion—at the worst, gas made from coal at super gas works astride the collieries can be pumped in the reverse direction through the mains, is his answer.

Indeed, in the case of oil, reversing the pipe-line flow has already begun. The original Pennsylvania field is largely exhausted, so that the oil formerly sent from it by pipe line to be refined on the eastern seaboard has been replaced in the coast refinery by oil brought in from the Pacific Coast or Gulf of Mexico by ship ; such oil is being sent back along the pipe to be refined at Pittsburg and elsewhere. Much more startling is the innovation to send finished petrol, or gasoline as the

Americans call it, along a 371-mile pipe from the coast to Western Pennsylvania : it is said that this will cost some 35 to 50 per cent less than the usual transport in tank waggons by rail.

Naturally all sorts of problems have arisen in connexion with pipe lines, the solution of which has been due to prompt and whole-hearted co-operation with scientific workers. Soil corrosion is a most important matter ; even the aeroplane has been brought in to assist in making the first survey for the path of the line through rough country. But for the production of better pipe and the development of welding methods which enable higher pressures to be used, the transport of the natural gas such distances would not have been possible.

The natural gas is obviously of very little value at the well, so that its cost delivered into the holder of a city gas company, even after full allowance has been made for the cost of pumping and the depreciation of the pipe, is less than that at which gas of equivalent heating value can be manufactured from coal at the gas works. This is of no disadvantage to the gas companies, the co-operation of which is essential to the success of any scheme for the introduction of natural gas, seeing that one of the main items in the cost of gas to the actual consumer is that of the distribution from the point of manufacture.

The lower the price at which gas can be supplied the more chance there is of its universal adoption as a source of heat : its use, whether by the householder or in industry, saves the worry connected with the purchase and storage of fuel, to say nothing of the labour of stoking and the removal of clinker and ashes. Most beneficial of all to the community will be the freedom from smoke in the cities.

In Britain this last factor should appeal to us most of all, but we have no natural gas and must therefore search in what other ways the price of the therm can be reduced. There is every indication that the desirability of this is realised by the gas industry, which apart from technical progress in the manufacture of gas in horizontal and vertical retorts, is studying the use of gas from coke ovens, from low temperature carbonisation and from oil refineries and cracking plants. It would take us too far now to deal with the somewhat vexed question of the production of oil from coal in Britain—it has been achieved technically on the large scale, though perhaps still a problem from the economic point of view. Scotch shale, cannel coal, and the like, will all eventually give their quota of oil and gas.

On the continent of Europe the supply of gas

in bulk from coke oven plants in the Ruhr district over considerable distances has already made much headway, though it is understood that the original schemes to take gas as far as Berlin have been deferred. Plans are also on foot to bring coke oven gas into Paris from a considerable distance.

The problem in Britain is not altogether so simple as might appear. The question of the cost of wayleaves for pipes and the assessment of these for rates by rural districts impose burdens which the consumer should not be asked to sustain if the nation has the production of cheap fuel and the lowering of costs in industry really at heart. The proposal to locate super gas stations at the colliery also requires very careful examination; not every seam is suitable for gas-making, whilst the ready marketing and cheap transport of the subsidiary products of the industry to the small consumer are factors of paramount importance.

An Everflowing Stream.

The Danube in Prehistory. By Prof. V. Gordon Childe. Pp. xx+479+57 plates. (Oxford: Clarendon Press; London: Oxford University Press, 1929.) 42s. net.

A BOOK of this kind has been long needed. As Prof. Childe notes in his preface, British archaeologists, in addition to their own local antiquities, have found in the first cultures of the Mediterranean and the Near East happy hunting-grounds and rich rewards. There are historical reasons for that, and also for the comparative neglect of Central and even of Northern Europe. Yet readers of Schliemann's works must have been impressed with the great mass of detailed work which had been done in these regions fifty years ago, however little they may have been convinced by his comparisons of this material with his own finds at Troy. It must be admitted, however, that until recently the very abundance and perplexing variety of the data retarded the appearance of any such compendious handbook as Peet's "Stone and Bronze Ages in Italy". Even Hoernes' "Urgeschichte der bildenden Kunst in Europa", before its recent transformation by his pupil Menghin, was essentially a history of art (and particularly of iconic art), not of civilisation. Latterly, the marked growth of popular interest in 'origins', as well as the necessity for some clue to such a labyrinth, even for specialists, has elicited summaries like Schuchhardt's "Alt-Europa", Tyler's "New Stone Age in Europe", and Prof. Childe's

own "Dawn of European Civilisation". But in so far as these attempted to cover the ground of Europe, and not stray far beyond it, they necessarily lacked scientific and historical, as well as literary unity. What "The Danube in Prehistory" gives us is a series of intimate studies of a family, instead of a snapshot at a crowd. The great valley now is no longer a corridor but a portrait gallery.

Prof. Childe is well equipped for his adventure. His intimate acquaintance with museum collections and recent field work all over Europe, his command of the rather numerous languages in which the literature is scattered, and his previous surveys of the ground in his "Dawn" (already mentioned) and his "Aryans", give him advantages which he has here used to the full. Above all, bulky as this book is, he has managed not to say too much; his characterisations of each phase of culture are graphic, and detach the really significant features from the bewildering details; and the comparisons, and inferences as to their meaning, which he has drawn, are so concisely stated, that it is only when one begins to know the book well that one discovers how much has been put into it.

Very properly, an attempt to rationalise a microcosm of this sort, begins with a profession of faith; and there are few, if any, shorter and weightier statements of an antiquary's creed and code than the preface here. Properly also, wild Nature frames the pageant of man's achievement: the physique, and the principal external relations of the Danube basin with adjacent regions. It would not have occupied more than a few additional pages, to indicate, still more concisely, what lies beyond the watersheds, even without anticipating by more than a phrase the peculiarities of the human contributions of each to Danubian cultures. Without this, the significance of successive references to horse-bones, for example, will not be obvious to everyone.

On the difficult problems of historical climate, and the sequence of plant-regimes, what is said is cautious and trustworthy, but it would have been helpful to emphasise the contrasts between forest-regimes north and south of the valley, and still more between the vegetations that replace them respectively when drought sets in. Beside the conspicuous contrast between superincumbent loess and older components of the structure, the petrological differences between different strata may seem slight; but there are phrases here and there which show that the author is aware of the marked peculiarities of 'karst' country, and the prevalence of this and other soluble rocks might have been