

IN A
PERSIAN OIL FIELD

*A Study in
Scientific and Industrial Development*

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With a Prefatory Letter from
The Rt. Hon. the EARL of BALFOUR
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Prefatory Letter from the Earl of Balfour to Sir John Cadman, the Chairman of the Anglo-Persian Oil Company.

WHITTINGEHAME HOUSE,
HADDINGTON,
SCOTLAND.

September 26th, 1927.

DEAR SIR JOHN CADMAN,

• I am very grateful to you for sending me Mr. Williamson's admirable work, "In a Persian Oil Field." You tell me that this is due in part to what I said at the Mansion House in one of the many speeches which I have made upon the application of science to industry. If this is so, I am indeed to be congratulated; and I am sure that those who share my views on this subject will derive, as I have derived, much satisfaction from reading this lucid exposition of a particular case in which science and industry have successfully co-operated.

Yours sincerely,
BALFOUR.

INTRODUCTION

THE sub-title proclaims this book to be a study in scientific and industrial development. So many publications dealing with science in industry have been issued in recent years that, perhaps, some explanation, if not excuse, is desirable for this addition to the number. Most of the contributions to the subject have approached the question on general lines and reinforced the argument by illustrative examples drawn from several selected industries or from numerous industrial firms. The method adopted in the following study is the reverse of this process; it is to describe, as a concrete illustration of the applications of science to industrial development, the work of one corporation only, the Anglo-Persian Oil Company, in one industry, the oil industry, and to treat the subject in such a way, it is hoped, as to lead to an appreciation of what is implied when we speak of the industrial applications of science.

If practice is better than precept, it may be that the study of how an individual corporation has assimilated scientific knowledge and methods into its industrial organism may be a useful complement to the studies that work down from general considera-

tions to numerous particular instances. The method of presentation here adopted, by enabling the record to take on something of a narrative form, may give to the subject matter an added, because an almost biographical, interest.

The main object of this study, then, is to show, in broad outline only, the extent to which the Anglo-Persian Oil Company has applied and is applying, especially in Persia, scientific knowledge and scientific methods in the oil industry; and also to describe, as integral parts of the same story, though again in outline only, some of the industrial, educational and social developments that have arisen, and have been sedulously cultivated, as natural outgrowths of the Company's work.

It is not the purpose of the writer to tell again the story of the D'Arcy concessions, of the long, indomitable and ultimately triumphant efforts, made in the face of great discouragements, to find the oil which it was suspected was to be found in Persia. That romantic story has been told before. Nor is it the purpose of the writer to describe the initial pioneering difficulties met with in the early years of the Company's work. That story has also been adequately told already. It is with other aspects of the activities and achievements of the Anglo-Persian Oil Company, more particularly in Persia, that this essay is concerned.

The following pages will, it is hoped, show clearly

that the financial profits made do not constitute the most important achievements of the Company and that, in any case, the commercial success that has been achieved is due very largely, perhaps predominantly, to the consistent and continuous application of science, in the widest sense of that word, to all, or nearly all, the activities of the Company.

Such an account is especially desirable in these days when statesmen, scientists, captains of industry and others are proclaiming the need for a more extended and more intensive application of science to industrial problems. If the record of what the Anglo-Persian Oil Company has done in Persia can be faithfully and adequately told, it may help, in some measure, to bring about a better and keener appreciation of all that science may do for industry, and must do for British industry if, in the stress of international competition, British industry is to survive.

The writer was invited by the Chairman of the Company to make a visit to Persia, in order to study on the spot this aspect of the Company's work and achievements. The visit, for personal reasons, was necessarily brief, but the writer had an opportunity during a period of nearly a month of visiting the greater part of the active area of the Company's operations in Persia.

It should be understood that what follows is not intended to be a critical review, from a scientific view-

point, of the work of the Company. It is, to speak frankly, an appreciation but, the writer hopes and believes, a judicious appreciation.

Nor is it to be taken, in any way, as a technical summary of the operations involved in finding, getting and refining crude oil. The numerous text books published on these subjects contain full information on these points, nor does the writer claim any particular competence to add to their number. What he went out to see was how far the work of the Anglo-Persian Oil Company in Persia was an example of the application of science to industry, interpreting the word science in its widest sense, so as to include the methods of dealing, not only with the raw material obtainable from the crust of the earth, but also with the human and sociological factors necessarily involved whenever and wherever large scale production is carried on.

The genesis of this book was inspired, to a great extent, by some observations made by the Earl of Balfour on the general subject of the application of science to industry. The writer records gratefully his indebtedness to Lord Balfour for the privilege of being permitted to include, by way of preface, the letter that precedes this introduction.

The writer expresses also his thanks to Sir John Cadman, the Chairman of the Anglo-Persian Oil Company, and to many members of the Company's

staff for the valuable and willing help given to him. It would take up too much space to name all those to whom he is so indebted, but the writer hopes he will be absolved from the fault of making any invidious distinction if he acknowledges especially his obligations to Mr. J. Jameson, Dr. M. Y. Young and the late Mr. H. Y. V. Jackson, with whom he was brought into frequent contact in Persia. To the Council of the British Scientific Instrument Research Association also the writer expresses his cordial thanks for the leave of absence generously granted to him to enable him to visit Persia.

J. W. WILLIAMSON.

3 *Verulam Buildings,*
Gray's Inn, London.
September, 1927.

PREFACE TO THE SECOND EDITION

THE first edition of this book being out of print and a new edition having been called for, the opportunity has been taken completely to revise the work and, by considerable additions, to bring it abreast of the latest developments. In particular the geophysical sections have been largely re-written and an entirely new chapter (Chapter XI, "Oil and Ethics") has been added, dealing with the larger, international aspects of the petroleum industry as a whole, so that the reader may be helped to see the Anglo-Persian achievement in proper perspective, as part of the world economic factor popularly summarised under the term "Oil."

The author is again greatly indebted to the kindness of the Chairman of the Anglo-Persian Oil Company and of many members of the Company's staff for valuable advice and assistance in the work of revision.

For the generous appreciation expressed by reviewers and private readers of the work in its first form the author tenders his grateful thanks. He would again emphasise that, although many reviewers have thought well to recommend the book to the attention of petro-

leum technologists, it is written primarily for the general reader who may have had no scientific or technical training, but who may be interested by such a striking and significant example of the application of science to industry as is here described.

J. W. W.

January, 1930.

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PART I
THE SCIENCE

CHAPTER I

THE PERSIAN OIL FIELD

It may be well at the outset to describe briefly the area covered by the Anglo-Persian Oil Company's present active operations in Persia and in the contiguous territories in north-east Iraq. This area extends generally in a north-west, south-east direction, from Chiah Sourkh and Naft Khaneh in north-east Iraq to Sulabadar in south-west Persia, a total distance in this direction of over 450 miles. From north to south it stretches for 150 miles or so from Gudar-i-Landar on the river Karun to the island of Abadan at the head of the Persian Gulf. The principal oil-field—the original and famous Maidan-i-Naftun field and its extensions—lies in the northern part of this area, in the district having Masjid-i-Sulaiman (Soloman's Temple) for its centre, some thirty-five miles east of the ancient Persian city of Shushtar, the oil being found directly beneath the foothills that give on to the high range of the Bakhtiari Mountains, which form the great barrier between the desert plains to the south and south-west and the great central plateau of Persia. Between the extreme well

in the north-west of this Masjid-i-Sulaiman oil-field and the extreme well in the south-east is a distance of about seventeen miles.

At Abadan there is a great refinery for the treatment of the crude oil from this field and also a modern port at which the tankers take in crude oil for shipment to the Company's new refinery at Skewen, Llandarcy, S. Wales, and refined products for other destinations.

Another important oil field has been opened and is in course of rapid development at Naft Khaneh in Iraq, some 100 miles north-east of Baghdad; and a refinery to supply local requirements has been erected to deal with the crude oil from this field, about twenty-five miles north-west of it, on the river Alwand, near Khanaqin, which is the head of a railway from Baghdad and also on the caravan route to T'cheran. A third important field is being rapidly developed at Haft Kel, about forty miles S.S.E. of Masjid-i-Sulaiman. Test borings are also being carried out at various places in south Persia.

That, roughly, is the area of the present active operations of the Anglo-Persian Oil Company in the Middle East. The area covered by the concession from the Persian Government is, of course, much greater. It includes practically all Persia except certain provinces in the north and north-west around the Caspian Sea, and covers no less than 500,000 square miles.

The visitor from Abadan who desires to reach "Fields"—the name given "for short" to the main oil field having Masjid-i-Sulaiman for its centre—may proceed by boat up the Shatt al Arab and then up the river Karun, which winds and twists through the desert, as far as Dar-i-Khazineh, some 170 miles by river from Abadan. At Ahwaz, about 114 miles up the river from Abadan, the navigation of the Karun is interrupted by a series of rapids and here the Anglo-Persian Oil Company has important workshops, stores and transshipment equipment, for transferring, by rail and road, materials and persons above and below the rapids. From Dar-i-Khazineh a railway has been constructed to Fields, via the gorge of the Tembi River. This is used mainly for transport of materials. A metalled road for passenger traffic also connects Dar-i-Khazineh with Fields and follows a route further to the north-west, through the foothills.

There is an alternative route to Fields. The desert between Abadan and Dar-i-Khazineh is an excellent natural road for mechanical transport, although, after heavy rains in the winter, it becomes impassable. The introduction of motor cars has reduced the time taken for the journey from Abadan to Fields from five days to eight hours. The river Karun is, however, with modern steamers and barges, still the most economical means of transporting heavy materials. The Company has recently introduced transport by air, and an aero-

plane has been provided and pilots engaged, so that members of the staff may now be still more swiftly transported from Abadan to Fields or to and from other areas of the Company's operations. A beginning has thus been made with an air service which is certain in time to be developed extensively.

The work of the Anglo-Persian Oil Company is, of course, to find oil, to get the oil when found to refine it and to distribute the refined products. It may simplify the task of showing to what extent and in what manner science has been and is being applied to the operations of the Company if we take, roughly, this order of presentment and then proceed to describe those social, educational and other developments which have grown with the growth of the Company's industrial operations, and, as will be seen, have been assimilated into the organic whole of the Company's corporate activities.

CHAPTER II

FINDING THE OIL

IN most countries where oil has been found indications of the presence of oil-bearing strata are generally, though not always, known before the geologist is called in to play his scientific part. Leakages of gas or of oil or of both—technically known as “seepages”—are often, and perhaps usually, matters of native knowledge and past history. The seepages may be misleading to the oil prospector. They may be evidence, not that oil in any quantity is now there, but that it has been there, the seepage being merely the residue of a once existing great store. Structural indications of the character and conformation of the strata forming the earth's crust often give to the experienced geologist better evidence of the probable presence of oil-bearing strata.

The problem of finding the oil is, therefore, essentially a scientific problem. It is not merely a matter of noticing some oil or gas oozing from the earth, or oil floating on the surface of some stream, and then drilling a well somewhere near by in the hope of striking a hidden oil field. When it is realised that to sink a well