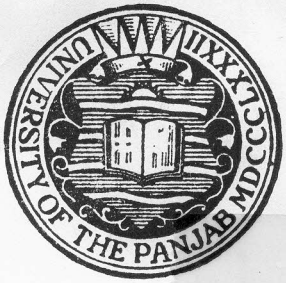
# PAKISTAN GEOGRAPHICAL REVIEW





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## CONTENTS

# AGRICULTURAL ECONOMY OF THE MIDDLE EAST

BY

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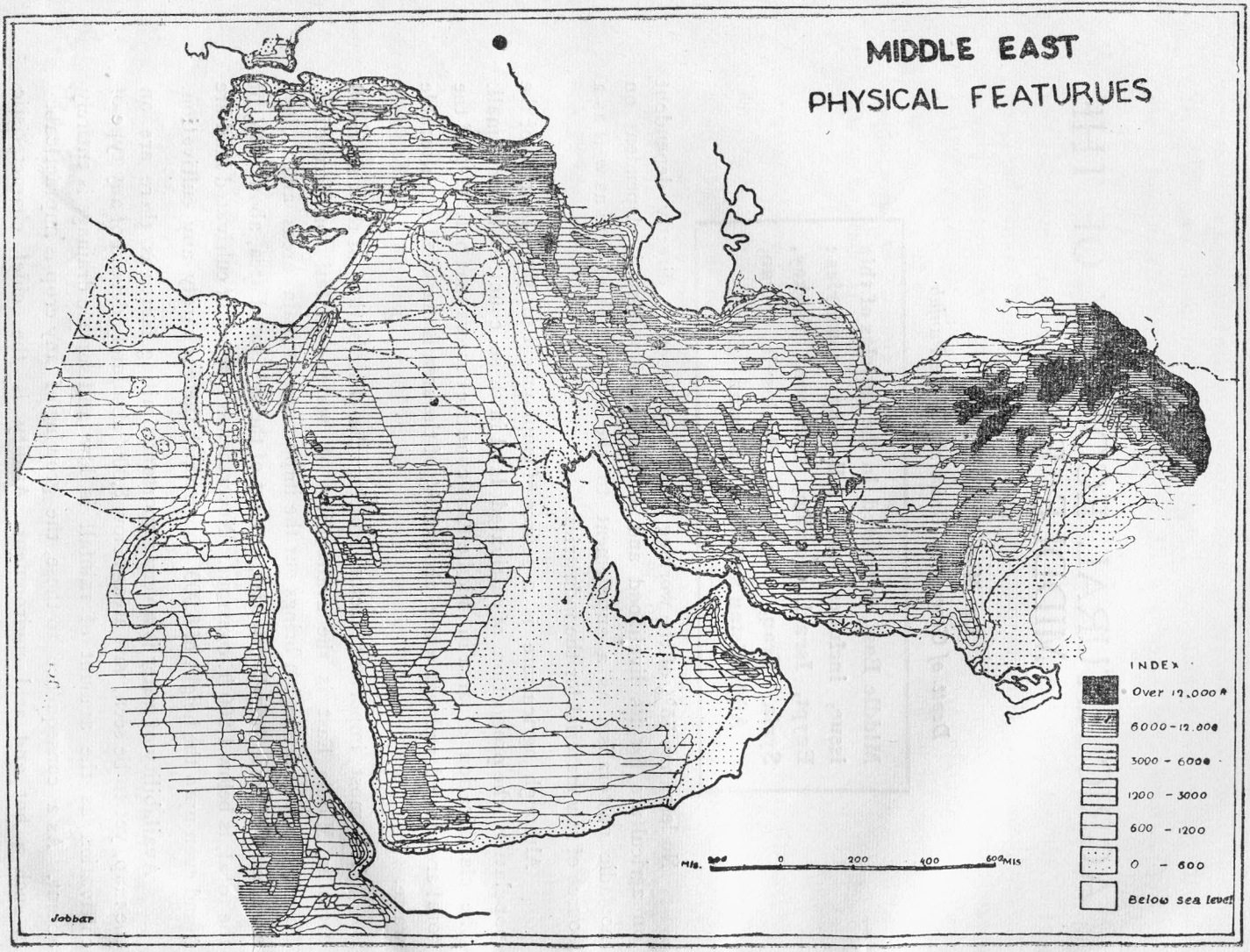
**Middle East, as treated in the articles of this issue, includes the following countries: Egypt, Israel, Jordan, Lebanon, Turkey, Syria, Iraq, Arabian Peninsula, Iran, Afghanistan and West Pakistan**—*Editor.*

No less than 75% of the working class population is directly dependent on agriculture for its livelihood and a further proportion is dependent on nomadic pastoralism as a supplement to the cultivation of land as well as a source of raw material for the industries.

Although agriculture is a source of employment for three-fourths of the population, the proportion of cultivated land in these countries is very small. The classification of area in Middle East countries shows that only 17% of the total area is under plough while about 20% of the area is classified as culturable waste.

The most important factor limiting the distribution of the cultivated areas in Middle East is the availability of water—rainfall or irrigation. Physiography of the region brings out the importance of plain areas and valleys as scenes of agricultural activities, as most of the cultivated area, about 70% of the total, is below 1,200 ft. controur. Nevertheless patches of cultivated land are found even upto the height of 6,000′ above which there is hardly any cultivation.

Availability of water is a very important limiting factor as there are on the map, yet to be seen, vast areas below 3,000′ absolutely devoid of any type of cultivation as the amount of rainfall is low and surface drainage is entirely absent. As a consequence to these, the growing of any crop is impracticable in such a hot and arid environment. Aridity is the chief characteristic


MIDDLE EAST
PHYSICAL FEATURES
INDEX
Over 12,000 ft
6000 - 12,000
3000 - 6000
1200 - 3000
600 - 1200
0 - 600
Below sea level
Mls.
0
200
400
600 Mls
Jabbar

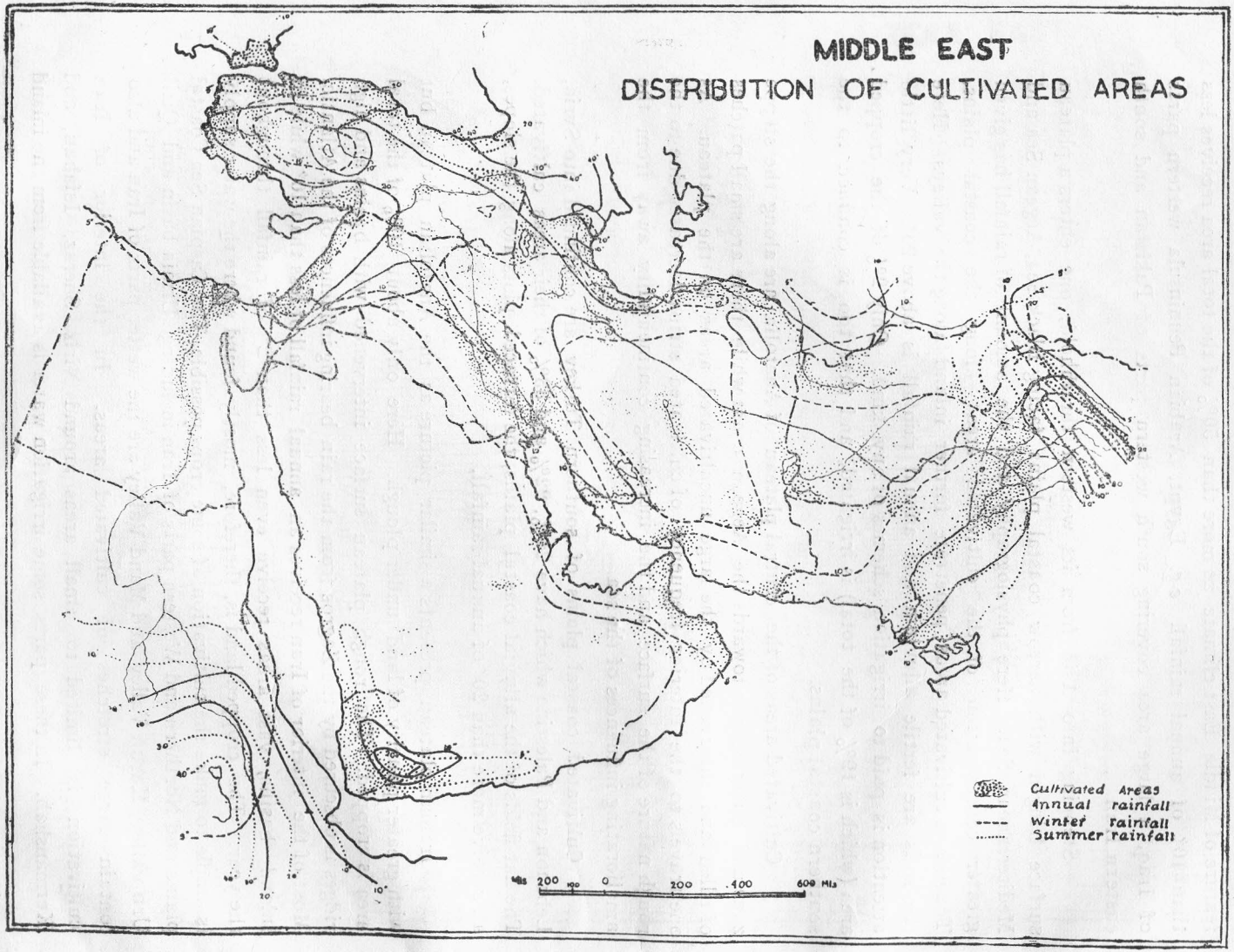
feature of Middle East climate as more than 50% of the total area receives less than 10″ of annual rainfall *e.g.* Egypt, Arabian Penninsula western parts of Iraq, a large area covering south western parts of Pakistan and south eastern Iran.

Stepping into Asia from its western threshhold, one enters a plateau surface fringed with narrow coastal plains facing Black Sea, Aegean Sea and Mediterranean Sea. Here physiography and the amount of rainfall has given greater concentration of the cultivated areas along the coastal plains. Tongues of cultivated areas penetrate further inland along the valleys. Here the soils are fertile alluvium and annual rainfall is above 20″. Very little attention is paid to irrigation schemes of any kind. Only 2% of the cropped area (which is 19% of the total) is irrigated, and that too is confined to the southern coastal plains.

Cultivated areas of the central plateau of Anatolia are along the steppe zone and outer slopes towards the Aegean coast while there are small patches of tilled land intervened by the large uncultivated areas on the plateau. As one travels to the interior frequency of cultivated strips decreases due to the rough nature of the surface and the increasing continentality away from the ameliorating influences of the sea.

Cultivated coastal plains of southern Turkey are continued into Syria, Lebanon and Palestine which have 24%, 22% and 33% of their areas cultivated. The flat fields of the alluvial coastal plains, the terraced plots along the slopes, all receive more than 20″ of annual rainfall.

Iranian plateau presents a similar picture as the Anatolian plateau but with greater paucity of land under plough. Here only about 10% of the total area is cropped. The rough plateau surface intervened with basins and high ridges is obscured by the Zagros from the rain bearing influences of the Atlantic. Most of the interior of Iran receives an annual rainfall of less than 10″ while in inland basins, vast areas receive even less than 2″ of rainfall throughout the year. The cropped land is, therefore, mostly found where the water supply is ample to make the cultivation of some crops possible. The Caspian Sea Coastal plains and Northern and Western parts of Iran including Urmia basin and Qizil Urn valley, Karun Valley and Mand Valley are the wetter parts of Iran and also contain large stretches of cultivated areas. In the interior of Iran cultivation is limited to small areas around Niriz, Sheraz, Isfahan, and Kermanshah. In these parts some irrigation water is available from the inland


MIDDLE EAST
DISTRIBUTION OF CULTIVATED AREAS
Cultivated Areas
Annual rainfall
Winter rainfall
Summer rainfall
Mls 200 100 0 200 400 600 Mls

streams. Khorasan and Seistan on the north east also have considerable acreage of cultivated land dependent mostly on irrigation.

Continuation of Iranian plateau eastwards brings in higher and rougher landscape in Afghanistan where cultivation is limited by high altitude as well as by cold desert. Only few areas grow some crop, the most important being Hari Rud Valley, Marghab valley, Kabul plains and Farah and Kash valleys draining into Seistan.

The patchy cultivation of the plateau areas of Middle East is bounded on the two extremities by the highly cultivated valleys of Nile and Indus with Euphrates and Tigris occupying a central position.

Egypt, the land of Nile, has much of its surface below 3,000′ yet only about 4% of its total area is cultivated. Low rainfall below 10″ (while it is less than 5″ during summer) is a very important factor limiting the extention of cultivated areas. There is no adequate source of water supply other than the Nile—lifeblood of Egypt. Because of the arid and semidesert conditions it is impossible to grow any crops with irrigation, with the result that Egypt has the highest percentage of irrigated land to total cultivated in the world (90%). The cultivated area follows the Nile from south to north and increases in width from 10—20 miles from Assyuit to Cairo on both sides of the river. Delta area forms a big triangle of very fertile and highly cultivated land.

The central valley of Middle East in Iraq is drained by two rivers—Euphrates and Tigris of historical reputation. The cultivated land of Iraq is only 6% of the total, mostly in lower Iraq along the two rivers. Only a narrow belt north-east of a line roughly running from Mosul, Kirkuk to Khanaqin has annual rainfall above 20″ and winter rainfall above 10″ to enable the cultivation of winter crops without the aid of irrigation. Soils of Lower Iraq are very fertile and the annual renewal of it is an important feature of the area. Most of the western and north western Iraq is a desert and semidesert area. While there is no dearth of level land in these parts of Iraq, the question of water supply is acute and there is hardly any acre of cultivated land for hundreds of miles. The desert conditions of western Iraq are continued into Arabia where a few oasis in the vast sandy stretches give some relief from the desert landscape.

There is some cultivation along the Yamen slopes where the amount of rainfall received annually varies from 10—15″. Terraces are carefully maintained and are distinct in their coffee cultivation. Oman has also some

cultivated land along the slopes and coastal plain. Here there are few seasonal streams which supplement the water supply to these few scattered fields.

The valley of Indus, with the alluvial plains of Panjab, Peshawar and Sind show a continuous stretch of cultivated land from the sea to the Himalayan foothills, from southwest to northeast. Successful cultivation is carried upto the height of 6,000 ft. West Pakistan thus shows the highest percentage of the cultivated area, (35% of its total, with 60% of it as irrigated.) Most of the cultivated area is in Sind, Punjab and Peshawar plains. Scarcity of watersupply accompanied with a low rainfall has limited the cultivated area as, in Baluchistan to Quetta valley and few other favourable localities. Given ample supply of water, the percentage of cultivated area in West Pakistan could be increased considerably as there is still about 12% of the land classified as culturable waste. Most of the intensive cultivation in the Indus valley is dependent on the waters of the Indus system. It is in this area that one finds some of the largest irrigation systems in the world.

To sum up the distribution of cultivated areas in Middle East, it would suffice to say that three valleys dominate the pattern, Nile, Euphrates-Tigris and Indus. It is these valleys of the Middle East and the marginal plains which are the focus of agricultural activity. Few and far between are the strips of tilled land over the plateau of Anatolia and Iran.

The greater proportion of cultivated land is held by landlords, while a greater proportion of the peasantry have very small holdings. The land is mostly held by landlords and is termed as Miri or Mulk. Large estate owners rent their land to tenants for share or rent cropping. Usually the landlord provides seeds and sometimes implements and receives a proportion of the harvest after paying the taxes. The proportion varies from one half to one third of the crop. Vagaries of nature are sometimes guarded against by this arrangement when the burden of crop failures are shared by both the landlord and the tenant. But the short term exhaustive methods of cultivation with the tenant frequently in debt to landlords and usurers is harmful. Every initiative towards improvement of agricultural methods and technique is discouraged and rotation is little practised.

The smaller proportion of agriculturists, who cultivate their own land, suffer from the great handicap of the small size of their holdings in general. The size of holdings varies in different parts of the various countries as affected

by the productivity of the land and the law of inheritance. The average size of the holdings varies between 10-12 acres in Turkey, 10-20 acres in Iraq, 6-9 acres in West Pakistan and 5-8 acres in Egypt. With such small areas divided into several strips of land, scattered all over the village land, the cultivator is unable to use machinery and to put to use scientific methods of tilling which would bring him large returns per acre and per head. This partially accounts for a lamentably low standard of living of the 'Fallah' in Middle East and his helplessness in treating agriculture as a scientific industry. His tools are the same as those of his forefathers. He thinks it sufficient to search the ground with his wooden plough and a bony pair of draught animals. The credit goes to the soil that with so much carelessness on the part of the cultivator some crop is harvested

**Crops.**

In a barani region where only about 28 per cent of the cultivated area is irrigated, conditions are more favourable for Rabi crop (winter crop) than for the waterloving Kharif crops. Excluding Pakistan about twothird of the cropped acreage is sown during winters when the moisture supply is fairly adequate in keeping with the winter rainfall maximum. The relative importance of Kharif (summer crops) increases in areas with adequate summer rainfall like Turkey or where facilities for irrigation exist—Egypt, Iraq and West Pakistan.

Cultivators devote a major proportion of the cropped acreage for the production of cereals, which occupy about 75 per cent of the cultivated land among the food crops, cereals grown in winter, like wheat and barley, supply the greater percentage of the total cereal production. The smaller percentage of cropped area under cash crops shows the low degree of intensive cultivation. With the production of food grains in Middle East is associated extensive cultivation with small per acre return, barley enough to supply the primary needs of man. The region produces on an average about 24.6 million tons of cereals annually.

Wheat is by far the most important and widely grown cereal. Middle East countries produce about 13.3 million tons of wheat annually, accounting for 54 per cent of the total cereal production. Barley is second in importance among cereals—though a bad second with an average annual production of only about 4.3 million tons. Maize and rice, the two Kharif cereals, are grown in well watered areas and the average annual production of these crops in Middle East is only 3.1 million tons and 1.7 million tons respectively.

Cotton stands first among the cash crops as regards its value, while raw sugar surpasses cotton in tonnage being just over a million tons. Fruits, dates and tobacco are other cash crops of considerable importance for individual countries.

**Wheat.**

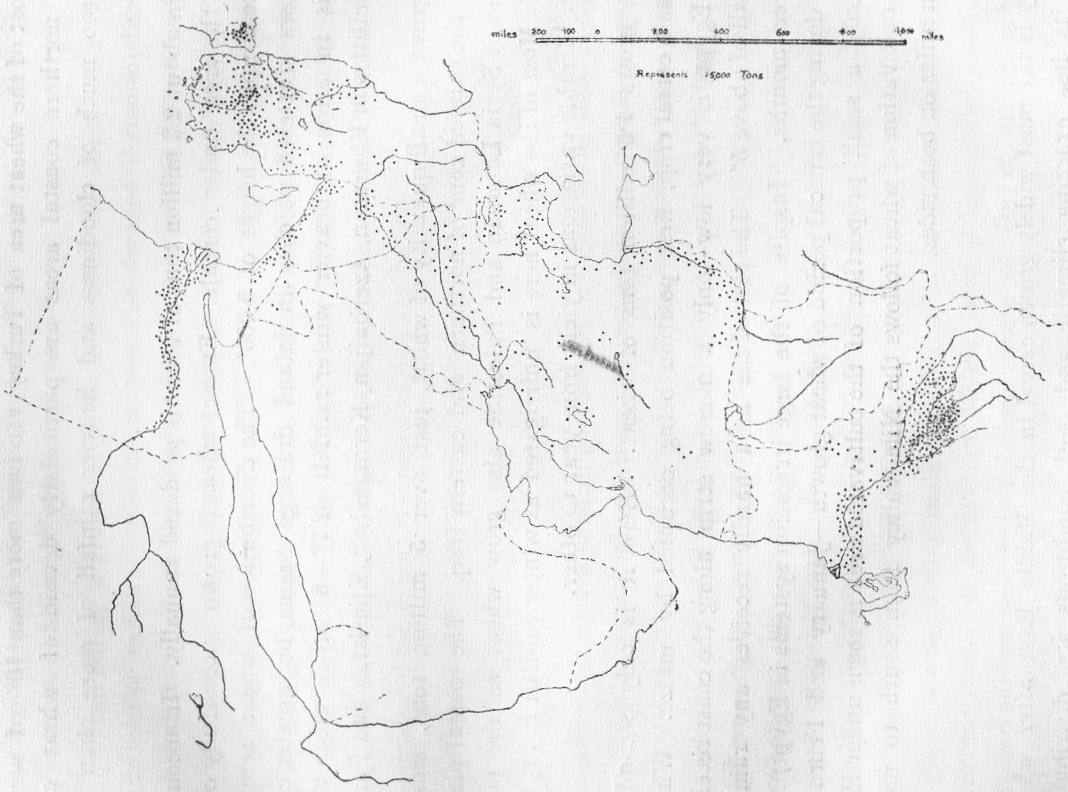
In Middle East countries where major proportion of the annual rainfall falls during the winter half of the year (November-April) wheat is the most important winter cereal. Wheat along with barley is a native of the Middle East. The origin of wheat is of a complicated nature. Most of the hard wheat varieties are formed by the crossing of Rin Korn and Emmer, both of which were grown wild in parts of Middle East. It is in these areas that wheat was first grown as a cultivated crop. Emmer variety of wheat is still the most widespread in Middle East because of its tolerance to altitude and cool climate particularly in higher parts over Iranian and Anatolian plateau.

The total production of wheat in Middle East in normal years is about 13.3 million tons. Most of it is grown as winter crop except in higher parts of Zagros and Afghanistan and eastern Anatolia where it is grown as spring wheat. It occupies first place in acreage and production in all Middle East countries except in Iraq and Egypt—in the former barley occupies first position, in the latter maize surpasses wheat.

West Pakistan is the largest producer of wheat in Middle East countries, with Turkey and Iran as second and third, all sharing 30%, 27% and 17% of wheat crop respectively. In West Pakistan it occupies 30% (10.7 million acres) of the total cropped area, 53% of the total acreage under food grains and 76% of the area sown in Rabi. Though it has 53% of the total area under food grains it shares 75% of total cereal production of West Pakistan. More than half of the wheat acreage in West Pakistan is irrigated hence it is grown successfully even in areas with winter rainfall below 5″. Two provinces produce most of the West Pakistan wheat, Panjab and Sind where the irrigation system is well developed. Only in the Potwar districts of Panjab wheat is entirely at the mercy of winter rainfall, and it is in this part that the crop is most uncertain. Yields of wheat are highest in West Pakistan among Middle East countries being 18.6 Quintals per hectare.

Turkey is the second largest producer of Wheat in Middle East with an average annual production of 3.6 million tons. It forms 57% of the total acreage under cereals and 55% of the cereal production. Most of the wheat is

# PRODUCTION OF WHEAT



grown over western parts of Asia Minor and the steppe zone flanking the inner plateau region. Along the western coast and on the plateau there is wide extent of fairly flat country over which the extensive cultivation of wheat is carried on. Some wheat is also grown on the southern coastal plains of Turkey. Most of the wheat area of Turkey receives more than 10″ of winter rainfall but northern coastal areas are particularly devoid of wheat corp because of too much of cloudiness and heavier rainfall of more than 20″ in winters.

In Iran about 2.2 million tons of wheat is produced annually. It accounts for 60% of the area under cereals. Emmer wheat is grown successfully over Iranian plateau upto the height of 5,000′. The distribution of wheat acreage in Iran shows scattered patches in inland drainage basins, but greater concentration is in areas of heavier winter rainfall of 7″—8″ or in areas with irrigation facilities in Khurasan, Azerbaijan, Kermanshah, Khusistan and Fars.

Iraq grows a small quantity of wheat, just over ·5 million tons, mostly confined to the rainfed zone of northern and eastern Iraq. The coastal plains and hill slopes of Syria Labonan and Palestine also grow wheat as the main winter crop. Most of the wheat here is unirrigated as winter rainfall is 10″ but there are considerable variations in yield from year to other.

Egypt grows 1·6 million tons of wheat. Here it is only second in importance as a cereal crop, first position being occupied by maize. Winter rainfall in Egypt is very low—only a narrow strip along the coast receives winter rainfall of above 5″. The rest of the area hardly receives any rainfall during winter months. Inspite of the large irrigation systems in Egypt, Nile water is low during the critical period of wheat growth—January and February —so that only a small proportion of the cultivated area is sown under Rabi crops. The cultivation of wheat follows the Nile valley from south to north for about ten miles on both sides.

**Barley.**

Barley is the most widely grown cereal in the Middle East after wheat. Because of its less exacting climatic and soil conditions its distribution is even less localized. It ripens earlier and can stand cooler and drier winters. The fact that Mespotamian measure of barley were taken as standard values as early as 2,000 BC, indicates that it is a native of Iraq—the only country in Middle East where it occupies the largest acreage among cereals.

The total production of barley in Middle East is 4.3 million tons, Turkey sharing 44% of the total Iran 21% and Iraq 19%.

Barley occupies about less than half the acreage under wheat. It is used for fodder as well as food. The main barley growing areas are over the central plateau and the inner fringe of Aegean coast lands. It is usually grown in areas of about 10″ of winter rainfall.

In Iran barley is grown in the same districts as wheat. It ripens three to four weeks earlier, hence it escapes the ravages of sunna pest so common in Iran and Iraq. Much of the barley crop here is used as human food.

Barley is the widespread cereal in Iraq since it thrives best of all cereals under Mesopotamian conditions—tolerent to aridity and salinity and it also yields better than wheat. The main growing areas are in Assyria (Mosul Erbel and Kirkuk districts) Lower Tigris valley (Kut, Shatt-el-Gharraf—an old drainage channel) and the Middle Euphrates (Nasiriya district) Besides food it is also produced for export purposes as malting barley.

Other countries produce small quantitites of barley crop as a supplement to the winter wheat.

**Maize.**

Maize is the third most important cereal grown in Middle East though the total production is only 4.3 tons. Unlike wheat maize is very exacting in its temperature and water requirements. Being a summer crop, it is sown in June-July and harvested in August-September. It requires high temperature 80°—90° during the growing period and abundant watersupply. Rainfall more than 15″ during the growing period or ample irrigation water is needed to produce a good harvest. It is its water demand and the skill and care it requires that has limited its cultivation in Middle East. though it yields heavier than wheat and is more supporting.

There are three main maize growing belts in Middle East—Nile sharing 61% of the total production in Middle East, Indus valley producing 13% and Black Sea coast and Aegean coastal areas of Turkey accounting for 19% of the total.

Egypt is the largest producer of this crop in Middle East. Since 1939, it has occupied the greatest proportion of cultivated land in Egypt. The total production of maize in Egypt is about 2 million tons. Greater concentration is on heavier clays of the Nile delta, though it is grown all over the valley. Its

heavy water demand is fulfilled by the irrigation from Nile. It is watered once every ten or twelve days. It is used as the principle article of diet.

Turkey and West Pakistan grow maize in smaller quantitites, .6 million tons and .4 million tons respectively. Its distribution in Turkey is very localised. Almost all the maize crop is confined to the wet and warm Black Sea coast and some grown on Aegean coastal plain, where summer rainfall is above 20″.

In Pakistan almost all maize is irrigated. Panjab and Sind grow most of it under irrigation as the amount of rainfall during summers is not adequate for a fair yield of maize.

Rest of the maize crop of .7 million tons is grown over small areas in Lower Iraq, irrigated plains of Esdraelon in Iran and coastal areas of Syria.

The yields of maize are highest in Egypt, 30% above West Pakistan on the average.

**Rice.**

Rice is fourth among cereals in production, the total in the Middle East being 1.7 million tons. The heavy demands of water, soil and labour have limited its cultivation to very small areas of higher summer rainfall. The largest producer of rice in Middle East is West Pakistan (.9 million tons). The main producing areas are in Punjab and Sind, where ample supply of water from the canals have more than made up the deficiency of rainfall.

Iran produces small quantity of rice (.4 million tons) mainly concentrated along the Caspian lands in the provinces of Mazanderan, Gilan and Rasht with heavier summer rainfall. Small amounts are also produced in other parts with the help of irrigation—*e. g.* Khuzistan, Kermanshah, and Sheraz basin. Until the introduction of rice in the 10th century, Caspian provinces were not of any agricultural importance as the warm and humid climate was not very suited to the cultivation of wheat and barley.

Lower Iraq produces some rice on the well irrigated rich alluvium soils. Egypt also grows some rice in the Delta area.

**Cash Crops.**

Cash crops occupy only a small percentage of the total cropped area. In some countries the production of cash crops is almost unknown. Cotton, sugarcane dates, tobacco and fruits are the main cash crops produced in

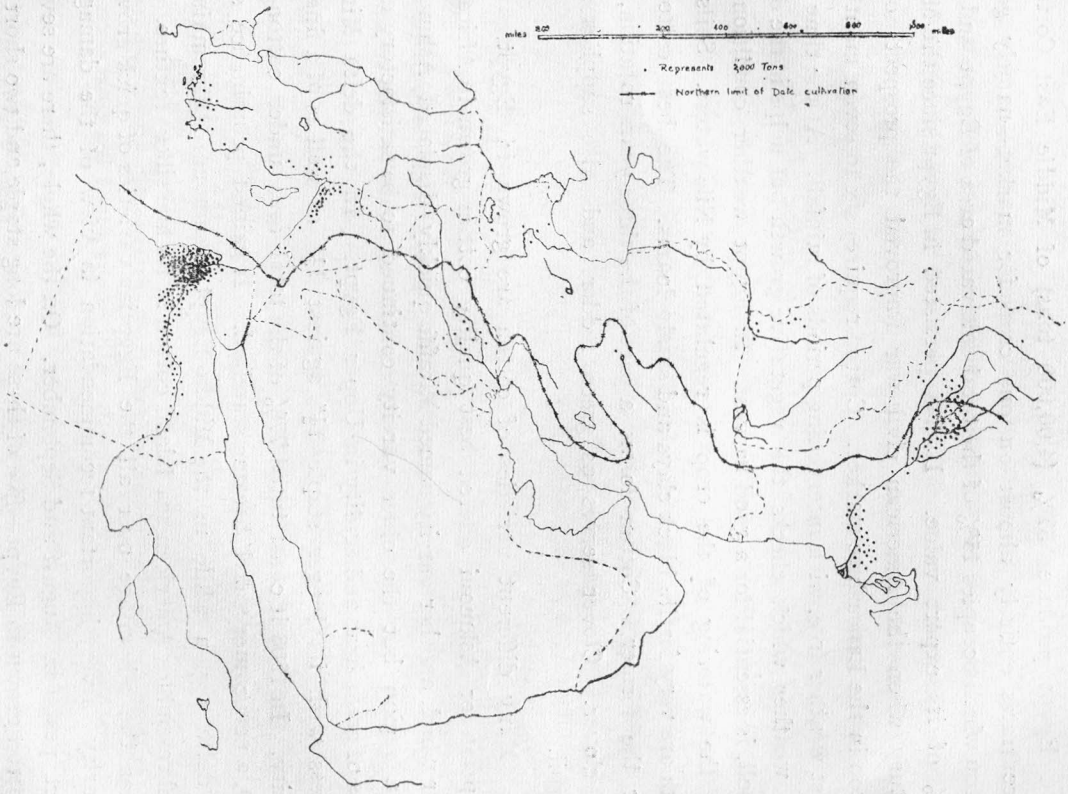
Middle East. Cotton is by far the most important as far as its value is concerned. Middle East produces 7,57,000 tons of cotton lint. The two cotton belts are on the two extremities of Middle East—Nile valley in the west and Indus valley in the east. Egypt produces the largest quantity, while Pakistan is a bad second. A small amount is grown in Turkey and Syria.

Egypt produces 57% (4,00,000 tons) of Middle East Cotton. Egypt concentrates entirely almost on one crop for market—namely good quality cotton which occupies 15% of the total cultivated area of Egypt and constitutes 70% of its export value. It has persisted in Egypt since the Middle of last century when the American civil war improved the prospects of Egyptian cotton in the Lancashire market. Cotton requires six to seven months of sunny, Frost weather free, with intervening periods of rainfall. At the time of ripening dry weather which checks the vegetative growth but helps in the development of boll, is essential for a good harvest. In Egypt weather conditions are ideal and the watering of the crop is regulated by Nile waters. Soils of the Nile Delta are very fertile black clays and sandy loams. The best cotton is grown over the former. Cotton forms a part of the three years rotation, with wheat and clover. Clover serves as green fodder and also supplies nitrogen to the soil.

Many different varieties of cotton are grown in Egypt. Old grown Egyptian or Ashmoni offered best quality cotton grown in Africa until 1882. After which another vareity named Mitafifi quickly displaced Ashmouni in the Delta region but the older vareity continued to be satisfactory under conditions of great heat and aridity in Upper Egypt. In the delta Mitafifi was a success with its longer staple $1\frac{1}{2}''$ against $1\frac{1}{4}''$ as well as of a finer and softer vareity. In 1906 it constituted 77% of the total area under cotton—but since 1910, a new comer 'sakel' became standard. It gained prominence specially in the delta region while in the Middle Egypt, Ashmouni still remains foremost. Sakel resembles American sea Island cotton in its fine silky texture. Moreover, it has the advantage over all the Egyptian varieties of quick growth to early maturity a very important recommendation in view of the damage done by insect pests in August and September. On the whole, there are seven varieties of cotton grown in Egypt—five of these are long staple and two short staple.

Cotton is grown all over the Nile Valley. In the central delta region more than 50% of the cultivated area is under cotton crop. Near the apex of the delta the figures are much lower ranging from 20—40%. Up the valley the

# PRODUCTION OF COTTON
# &
# DATE CULTIVATION



percentage area under cotton varies from 30—40% uptill Assuit beyond which it is reduced to 10%.

Much of the cotton cultivation is done by hand. After wheat or clover harvest in February and March, ploughing for cotton sowings takes place. During the hot summer months of June, July and August, the plant is watered once in every fortnight. The total amount of water supplied to cotton plant in the field is equal to about 30″ of rainfall.

The average yield of cotton in Egypt is 5·4—6 6 quintals per hectare which is highest in the world, almost twice as much as the average yield in USA. Since consumption is small, large quantities of cotton are available for export (6 million bales).

West Pakistan is the second largest producer of cotton in Middle East. Though cotton has been grown in West Pakistan since times immemorial for purposes of spinning and weaving the modern history of cotton in this region begins with the dawn of the 20th century when attempts were made to acclimatize American upland varieties in the Panjab. These attempts proved highly successful and in 1914, the cultivation of American cotton known as Punjab American or 4F, began on a commercial scale. Since then the steady progress has been maintained and the improvement in quality of cottons grown in Indus basin by botanical research, provision of irrigation facilities and better agronomical practices. A number of improved varieties have developed and are cultivated on a large scale, among them are LSS, 289F, and 124F, 199F, Sind Sudhar M4 etc.

These varieties have taken kindly to the soil and climate of the Indus valley, that in the short space of 36 years since their introduction nearly 87% of the area under cotton cultivation in this region is covered by American varieties while they constituted nearly 90% of the total production of 1,74,000 tons. Since there is no finality in scientific research, the work of improvement of cotton in the Indus valley goes on increasing and it is hoped that in the next few years, still better varieties will be produced for general cultivation.

At partition, Pakistan inherited 22% of the cotton area of 'India'. The total area now under cotton in West Pakistan is 26,49,000 acres. The main producing districts are Lyallpur, Shahpur, Gujrat, Jhang, Sheikhupura, Montgomery and Multan, Sind-Hyderabad, Tharparkar, Nawabshah, Bahawalpur and Rahimyar Khan.

In other parts of Sind and Panjab cotton is not grown in any large quantity About 90% of the area under cotton is irrigated and practically the entire area under American cotton is irrigated. The deficiency of rainfall which is under 15″ in summers is fulfilled by the ample supply of canal water.

Like Egypt, the home consumption of cotton is small and over 800,000 bales of cotton are at present available for export.

Small quantities of cotton are produced in Iran (mainly in Azerbaidjan, Mesandran and Isfahan), Turkey, (between Adana and Mersin, in Ismir region and in south eastern Turkey) and in Syria.

**Raw Sugar :—**

Middle East is deficient in the production of raw sugar for its requirements. It produces only about 1,046,000 tons of raw sugar of which West Pakistan shares 64%, Egypt 22%, and Turkey 14%. It is interesting to note that to the differences in the climatic conditions, both the tropical plant, sugar cane and the temperate plant sugar-beet are grown.

In West Pakistan and Egypt sugar cane thrives well due to hot and sunny weather and ample supply of irrigation water. In Turkey, which is the third largest producer in Middle East though the moisture supply is plentiful, the temperature conditions do not favour the cultivation of sugar cane hence sugar-beet is the source of raw sugar for this country.

West Pakistan grows about 678,000 tons of raw sugar annually. The area under sugarcane is only about ·48 million acres of which 316,000 acres is in West Punjab, 110,000 acres in NWFP, 13,000 acres in Sind and 43,000 acres in Bahawalpur.

The distribution of this annual crop in the Panjab is in one continuous belt comprising of Sialkot, Gujrat, Lahore, Shahpur Sheikhupura, Gujranwala, Lyallpur and Montgomery. In the NWFP most of the cane is grown in Mardan and Peshawar districts with very small acreage in Bannu plains.

The yields of sugar are good—3 maunds of raw sugar per acre in Peshawar and Mardan and 2·5 maunds per acre in the Panjab. With the extension of the irrigation system in the Panjab and NWFP the area under sugarcane has expanded considerably during the last two decades.

Much of the cane is turned into brown sugar, known as Gur while the rest is refined into white sugar. The opening of the Mardan Sugar Mills is a step towards self suficiency in the requirements of refined sugar.

In Egypt some 231,000 tons of raw sugar is produced. Cane cultivation is confined to well irrigated parts of Lower Egypt and delta area.

In Turkey sugar beet production has been given great importance during the last two decades and the production has increased from 100,000 tons to 700, 000 tons since 1930. A large importer of suger, Turkey is now virtually self sufficient in sugar production. The chief regions of production are on the western and north western coastal areas in the districts of Eskesehir and Bireijik and some in European Turkey. The best producing areas are carefully aligned near the transport lines for easy transport to the factories.

**Tobacco** :- -

As a commercial crop it is of great importance in Turkey, which is its largest producer in Middle East. Tobacco to Turkey means what cotton means to Egypt. It produces about 100,000 tons of Tobacco, 60% of the total Middle East production. Although the production is in the hands of private individuals, the handling, marketing and export are vigorously under government supervision. There are five districts known for Tobacco production in Turkey :

1. Samsun 2. Sinope 3. Smyrna. 4. Baffra and
5. Ismid.

Three fourths of the Tobacco comes from the northern coastal areas where rich soils and high summer rainfall fulfils the requirements of the plant.

Tobacco is not a native of Turkey. It was introduced here from America in 1612. It has so adapted itself to Turkish soil and climate that it has lost many of its American qualities and developed its own flavour so much so that it is said that a good cigarette cannot be made without mixing some of the Smyrna tobacco.

The better quality is also due to the skill with which it is cultivated. It is sown in spring time and harvested in September or October. Unlike American tobacco it is harvested leaf bv leaf. The work is done early in the morning when the dew has moistened the leaves so that the stems break without any injury to the leaf. Picking is limited to four leaves from each plant. Grading, treating and drying operations follow. After three or four weeks of drying, the strings of tobacco are packed into piles and covered with blankets. After this it is taken to market and baled and wrapped. It is left in such condition in the warehouse to age before it is ready for export.

In West Pakistan tobacco cultivation has not reached such specialisation as in Turkey. Production amounts to only 30,000 tons. The main areas of production are the irrigated parts of Punjab and Mardan district in NWFP.

**Dates.**

Date production on a commercial scale is carried on in Iraq, and also in Egypt. Natural aridity and the suitability of light moist sandy loams to this plant have made it a native of the Middle East. It produces about 300,000 tons of dates annually and supplies 90% of the world's commercial dates. The most important date producing area is in Iraq which produces 80% of the world's dates is in its lower valley region. Fifteen inch isoheyt is the wet limit where dates can grow successfully. Dates flourish in dry sandy loamy or even water logged soils with high salinity. Date producing area extends from and over Iraq eastwards following the Persian Gulf coastlands of Iran and further into Makran coast and Lower Indus valley. Westwards the northern limit of date cultivation passes north of Egypt.

In Iraq the region of Shatt-el-Arab is very well suited to the prduction of dates and both banks are lined with date trees extending inland to a mile and a half. Out of the total of 25.30 million trees cultivated in Iraq, about half are along shatt-el Arab and the rest along the two rivers as far north as 33°N. The groves along Shatt-el-Arab are regularly flooded to give a natural irrigation water under the influence of the incoming tides which raise the river level by about 3 feet.

Cultivation of date groves is carried on by hand once in four years. There are about 130 varieties of dates but three of them are most commonly grown. Halavi is the finest variety and yields about 44 lbs a tree. Sayir is the most widely grown as it accepts inferior conditions of soil and water supply. It yields less than the first variety. Zahidi is inferior but yields heavily (120 lbs per tree) which more than makes up for the low price it fetches.

Picking season is in July and August when a large number of namads find work in lower Iraq in the harvesting season. Date cultivation serves various purposes. It is used for diet, stones are fed to animals leaves and stems are for light constructional purposes and for paper manufacture. About half of the dates produced are exported.

Though Iraq has a unique position as an exporter of dates in the world market and this position is not likely to be threatened, the quality of dates has deteriorated, only about 15% of the gardens are replanted while most of the rest receive no attention. There is much room for improving the yields and better handling of the crops and modernizing the packing.

Egypt produces some dates but exports very small quantities. In the rest of the Middle East date growing areas, dates are produced for local consumption.

**Market Gardening.**

Middle East countries round the Mediterranean have fruit culture of a fairly high standard and in most parts fruits and vegetables form an essential part of the diet. In western part of Middle East the mid day meal is accompanied with olives, dates or onions. Orchards and gardens are an important accompaniment to the cultivated fields.

Climatic conditions have combined the features of both tropical and temperate regions which have given abundant varieties of fruits grown—olive, figs, grapes, apples, oranges etc.

Olive trees occupy $\frac{1}{4}$ to $\frac{1}{2}$ of the area under fruit trees in Middle East. Olive oil supplements for cooking fats in the region which is otherwise butterless. It is also used as an illument and in soap industry. The crushed stones are fed to animals.

Olive, a Mediterranean fruit, thrives best in regions of abundant rainfall with a long dry summer as even a small amount of summer rain reduces the oil content of the fruit. It can stand 15° of frost for a short time. Its tolerance to aridity accounts for its growth outside the Mediterranean under artificial irrigation and as an oasis plant it is found growing as far east as Iran.

Most of the olive production of Middle East comes from Anatolia where it is grown as a commercial crop, about 1,70,000 tons of olives are produced and about 30,000 tons of olive oil is extracted. The main producing areas are valleys of south west Anatolia, lower Orontes, Seyhan plains of Turkey and environs of Latakia, Tortus, Tripoli, Damascus and Beirut.

**Vine.**

Vine is second in importance among fruits. The production has varied a lot in the past when the ban on the alchoholic beaverages had a restrictive effect. Turkey, Iran and West Pakistan are the chief producing areas. Turkey produces about 1·5 million tons of grapes. Some of it is consumed as fresh fruit and in dried form as sultanas while the rest is exported. Vine is prepared in small quantities by the non-Muslim population.

Vine is less tolerant to great heat and damp atmosphere, hence it avoids warm and moist coastal areas. Hilly countries suit the plant best. Foot

hills of Lebanon and western Syria, almost the whole of lower hill slopes of Asia Minor, many parts of western and northern Iran, frontier areas of Pakistan in Baluchistan, Peshawar and Mardan, are the main vine growing tracts of Middle-East. It forms an important supplement to cereal production.

Another important Middle East fruit is fig. Like olives it requires long hot summers but is not affected much by either aridity or moisture hence it is frequently grown on the Mediterranean coastal plains of Middle East.

Other fruits produced in Middle East are apricots, peaches and pomegranates. Nuts like almonds, pistachio and walnut are more important in Iran and Afghanistan.

**Citrus Fruit.**

Citrus Fruits are grown along the eastern Mediterranean coast of Lebanon, Syria, Palestine and also in West Pakistan but as a commercial commodity, they are most important in Palestine. Most of the Palestine oranges came from plains of Sharon and Acre district. Oranges have been grown here for over 2,000 years but great expansion took place following the immigration of Jews—after 1880. During 1930, oranges were the most important production of Palestine and accounted for 70% of the export value but after 1939 the area has reduced on account of over production and difficulties of disposing the surplus, due to World War II. The acreage now is 40,000. Grey fruits and lemons are also grown.

In Pakistan imported varieties of citrus fruits have met with great success—specially in the Panjab canal colonies where the water supply during the summers is assured.

We have discussed the production of various crops in the Middle East. A survey of the agricultural economy would be incomplete if no account is given of the irrigation system in the Middle East where the problem of water supply is an acute one. In an arid region like this, importance of water supply through various methods could hardly be over emphasised. With only 28% of its cultivated area irrigated, Middle East has a good supply of food grains and produces some of the cash crops like cotton, sugar and tobacco. Without irrigation the region would be a deficient area even in food supply. It is the highly irrigated areas that support more than 60% of the total population in Middle East.

The percentage of irriated to the cultivated area in each country varies a great deal. Highest figures are for Egypt where about 90% of the total cultivated area is irrigated. High temperature during the long dry summers necessitates the ample supply of water. West Pakistan has about 60% of its cultivated area as irrigated by various means, canals, wells or tanks. Here too the low rainfall received during the year (greater part receiving under 10") has driven the agriculturists towards artificial means of water supply. In Iraq about 50% of the total cultivated is irrigated mostly in Lower Iraq valley, which is more arid but very fertile, so that the return from the irrigated land is worth the expense. Syria and Iran have 22, and 20% of the cultivated area irrigated.

The lowest figures are in Turkey mainly due to the abundant rainfall which is adequate for the production of various crops

In countries where the irrigation systems are most developed, nature has favoured them with some initial advantages.

(1) Abundance of fertile level lands which could yield abundantly when provided with ample water.

(2) Abundance of water in the rivers that could be used for irrigation.

Here below is considered the irrigation system of the countries where it is most developed.

1. Irrigation system in Egypt.
2. do. Iraq.
3. do. Wes Pakistan.

**I. Irrigation in Egypt.**

The source of irrigation water in Egypt is river Nile and its tributaries. There are at present two methods of irrigation in Egypt, basin irrigation and perennial irrigation. Basin irrigation has been in vogue since historic times. This method consists of dividing of the fields into shallow basins by a series of earthen embankments 4 to 6 feet in height. Flood water of the river would fill the basin depositing also the silt. As the river recedes, water is retained in the fields for a few weeks until the soil is saturated. This system allows only one crop a year in winters when the autumn floods provide the basins with ample water.

For the growth of summer crops like maize and cotton and rice perennial irrigation is necessary. For this purpose two large barrages at Aswan and at Jebel-Awaliya have been constructed in Sudan to impound flood waters for several months so that Nile flood period is extended to December and January

when Nile used to be critically low. Aswan dam was completed in 1903—1912, and finally in 1933, has increased its capacity to 1,77,000 million cubic metres.

Besides these two regular dams, there are minor barrages whose function is to raise the local level of the water, thus supplementing basin irrigation and extending the area within reach of feeder canals. The other dams are :

(1) At Zifta on Damietta branch of Nile.
(2) North of Cairo, Mohammad Ali Barrage.
(3) Assuit, 200 miles above Cairo.
(4) Nag Hammadi—160 miles south of Assuit.

Under construction is Edfina near the mouth of the Rosetta branch to extend the area under cultivation in the Delta region. Besides these dams some pumping stations in the Delta region at Abil, Menaga, Balama, Fua and Atf have started work.

As a result of these developments, double cropping of the land has been made possible and summer crops now occupy more than 40% of the cropped acreage. Though the advantages of perennial irrigation are manifest in the increased production of cash crops and high yields, some disadvantages though of minor type have also been observed—namely the increase in salinity due to plentiful water and capillary action, and the soil deplition due to frequency of double cropping. The crops have become dependent on imported fertilisers so much so that the cut in the imports of fertilizers during the World War II affected the yields adversely.

Despite these disadvantages, the remedies of which are being sought, production per acre over irrigated land is very high. Wheat yields are almost equal to those in western Europe while maize and cotton yields are highest in the world. (One ton per acre and 600 lbs. per acre respectively).

**Irrigation in Iraq.**

Irrigation here is mainly carried on in lower valley region depending on the two rivers, Euphrates and Tigris. Storages have been necessarily constructed to regulate the flow of these rivers and provide ample water during the critical period of autumn. Irrigation here presents varied problems :

1. Storage of water for controlling floods.
2. Expansion of irrigated land.
3. Provision of drainage to prevent deterioration of land.
4. Operation and maintenance of the system. The storage of water is

the foremost problem. The two rivers carry about 70 billion cubic meters of water every year—a quantity theoretically enough to irrigate vast areas. Much of the flood waters in spring go waste when it is too late for the use of winter crop and too early for the irrigation of summer crops.

Old irrigation system in Iraq was destroyed during the Turk occupation but since 1880, a revival of large number of canals has taken place along with the construction of new barrages.

At present there are three modern barrages and one weir—Haidiya and Daghgara barrages and Diyala weir. Haidiya barrage was constructed in 1913, and improved in 1922—its main functions are to raise the level of Euphrates so as to irrigate the districts of Karbala and areas on the left bank as far as Ramadi. The newest barrage is at Kut on Tigris, completed in 1943—2,100′ in length. It has brought under cultivation areas south east of Kut, Shatt-el-Gharraf and Shatt-el-Dujala. Water is used mainly to irrigate winter crops, as for summer crops it is needed below Amara.

Diyala weir feeds six canals which irrigate extensive areas north and south-east of Baghdad.

Besides this free flow irrigation which serves 53% of the irrigated area, rest is watered by means of pumping. There are many future projects, mainly on the tributaries of Tigris—Lesser Zab and greater Zab. Habbania and Wadi Tharthar projects are also being contemplated.

Increased salinity due to water logging has become a serious problem in some parts of Lower Iraq. The remedial measures include the improvement in the drainage of the affected area and a restricted supply of irrigation water.

**Irrigation in Iran.**

Despite the dry climate, not much attention has been paid to the development of the irrigation system. Difficult terrain, predominance of rough surfaces and lack of surface drainage are some of the difficulties. Most of the irrigation is done by construction of small barrages and Kanats in Khuzistan, Kerman, Siestan, Fars, Isfahan and Tehran. It is estimated that further developments could bring a total of 2.5 million acres of land under irrigation.

**Irrigation in West Pakistan.**

West Pakistan has some of the largest irrigation systems in the world. The total irrigated area is more than 2 million acres. There are two main methods of irrigation—

1. Wells. 2. Canals.

**Wells.**

Wells have been a source of water since historic times. Most of the wells are located in the submontane area where the water table is high. In most of the Panjab and Sind plains where the canal waters are not within reach, wells are an important source of water supply.

During recent times tube wells are becoming quite common as, besides supplying abundant irrigation water, they are a great help in lowering the water table in the canal irrigated areas and thus reducing the danger of water logging.

**Canal Systems in West Pakistan.**

Most of the waters of the rivers of Indus system which used to go waste, have been successfully utilised for irrigation purpose by the construction of barrages and dams. In Panjab over 11 million acres of land, in Sind 5 million acres, in Bahawalpur 2 million acres, in N.W.F.P. 9,70,000 acres have been irrigated by canals. There are three types of canals, perennial, seasonal and flood canals.

Besides six major cannals taken out from the Panjab rivers there are other projects as Sutlej Valley project, and Thal Project which are meant to serve large areas with abundant water. The last mentioned is under construction and is nearing completion. It will irrigate about 2,000,000 acres of land —and shall result in a substantial increase in the production of wheat, cotton and rice.

In N.W.F.P. Peshawar and Mardan plains are irrigated by three main canals, Upper Swat, Lower Swat and Kabul river canal. In Bannu and Dera Ismail Khan there are many small canals serving the cropped land.

In Sind we have one of the largest irrigation systems with Sakkar barrage or Lloyd barrage as one of the largest in the world. Seven large canals take off from here and irrigate 5 million acres of land. Lower Sind barrage which is under construction shall bring another 2.5 million acres of land under irrigation, In Baluchistan, most of the irrigation is done by Karez (Iranian Kanat) system.

Besides the irrigation system mentioned, there are various multipurpose schemes which are under construction, namely Malakand scheme, Warsak project, Rasul Project and Mianwali project. These schemes will provide irrigation. water as well as hydro-electricity in various parts of West Pakistan.

The above survey of the agricultural economy of Middle East shows that it is on the whole self sufficient in food supply as it produces approximatey 5 maunds of cereals per head. To be only countries which show deficit are

Jordan and Lebanon while Turkey, Iraq, West Pakistan and Egypt show a little surplus in normal years.

The main exportable commodities among cereals are wheat and barley. Among fruits, olives, grapes and oranges are important items of export. Large quantities of cotton from the Middle East countries, about 60,00, 00 bales from Egypt and 8,00,000 bales from West Pakistan are available for export. Tobacco from Turkey and 2,00,000 tons of dates from Middle East mainly from Iraq, are exported to other countries of the world.

Some problems connected with agriculture are :—

1. Average low yields as compared to other countries of the world.
2. Underfed soils—need for fertilizers.
3. Need for improved varieties and technique of cultivation.
4. Soil erosion.
5. Small size of holdings—a great hinderance in development schemes.

**Pastoral Industries.**

Pastoral industries form an important supplement to agricultural resources in an arid region. Natural pastures though very poor are quite extensive in area, about 19% of the total area in Middle East.

Sheep and goat rearing is most common due to the arid climate and short grasses which are insufficient to feed the cattle. The total number of sheep and goats in Middle East is 55 million and 26.7 million respectively. The wool production amounts to 89,000 tons. Turkey being the largest producer having the largest area under pastures (55%).

The wool and goats, hair are mainly supplied to the cottage industries of carpet making and rug preparing in Iran and Iraq, Turkey and Egypt but the home consumption is very small—large quantities are exported as raw wool along with hides and skins.

# OIL IN THE MIDDLE EAST

BY

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**Introduction.**

Petroleum is not an uncommon mineral in the world. It is its economic concentration that is of rare occurrence and which is ardently sought after by the power hungry world. There is little doubt abou' its organic origin, though opinions differ on details. It is believed to have been formed by the decay and decomposition of the organic remains deposited with the marine sediments. Sea weeds and minute marine organisms chiefly planktons were deposited with the sediments in the offshore regions of stagnant shallow seas. Anaerobic conditions in the lower levels of the sea helped in the putrification of the organic debris and the absence of oxygen precluded the loss of organic matter by oxydation. Bacteria may also have caused biochemical decay resulting in the formation of various hydrocarbons. Besides this biochemical process, long and slow low temperature distillation is also thought to be a probable mode of formation of petroleum.

From the study of the geological conditions of the oil fields of the world, considerable knowledge has been gained regarding the favourable conditions for the formation of petroleum and its most probable palaeogeographic distribution. During the geologic times there had been regions all over the world characterised by the prevalence of great gulfs and inland seas. Most suitable conditions for the formation of petroleum were provided wherever rivers deposited great loads of muddy sediments in the shallow waters of those basins of sedimentation. The movements in the earth's crust have relatively changed their position by lifting them up. And some of those basins form dry lands and provide hidden oilfields of the world. It is in such regions that most of the great oilfields have been found. Caribbean sea gulf of Mexico basin is the best known and highly explored petroliferous basin of the world. The Middle Eastern region constitutes the richest petroleum basin known to the world today. In it are included a number of sedimentary basins very rich in petroleum content.

The organic content produces oil in the form of disseminated globules of oil and bubbles of gas widely scattered in the contained saline water of the sediments. In the process of compaction of the sediments by continued accumulation of sedimentary load and also by dynamic processes, the shrinkage in volume of the sediments squeezes the water out along with its petroleum content, into the more permeable strata. The dispersed globules of oil segregate from the water in the process of migration through the permeable beds by selective filteration processes offered by the water soaked or oil-soaked beds of varying sedimentary texture. As a pre-requisite to this process of accumulation the reservoir rock should be capped by impervious beds which should prevent the upward and downward escape of the fluids and allow only the lateral movement along the pervious host rock.

Economically exploitable pools of oil are formed either as a result of some structural traps or some stratigraphic pockets created due to the textural variations in the permeable beds. Oil along with gas tends to accumulate on the crest of anticlines while moving with water through the strata. This continued slow process of accumulation and segregation distinctly separates gas, oil and water in order of their specific gravity. Millions of years pass before some appreciable pools of petroleum are formed. During this long period the fluids are subjected to high pressure due to the increasing load of overlying beds, and partly due to the hydraulic head of the fluids contained in the oil bearing rock, and also as a result of mountain building forces that have effected the region. The pressure in the gas increases also due to the rise of temperature accompanying these processes. As a result of this pressure some gas gets dissolved in the oil and the rest remains as free gas on top of oil known as gas cap. Wherever these pools of petroleum under high pressure are pierced by some wells, the oil and gas tends to rush out due to the differential pressure in the bore hole and inside the oil rich strata as a whole. This tendency greatly facilitates the pumping of oil from the great depths of oil wells. As the pressure gradually decreases the dissolved gas from the oil comes out of solution as bubbles and occupies the pore space of the rock and in doing so displaces the oil and forces it towards the well. And thus helps in the extraction of entangled oil from the pore space of the reservoir rock.

## RELATION OF OIL FIELDS WITH GENERAL GEOLOGY AND STRUCTURE OF THE AREA.

In an attempt to correlate the widely distributed oil fields of the world and find any possible relationship with some salient geologic, structural or

orographic features of the world, it has been found that most of the oil and gas fields occur in structural sedimentary basins of the world. These sedimentary basins are scattered all over the world and L.G. Weeks has convincingly shown the relation between the two. Sea of Tethys that sprawled across the greater part of the world from Gibralter to Java, provided ideal conditions for the formation of petroleum in the later part of its history. During the Tertiary times the Alpine Himalayan Orogeny caused the uplift of the greater part of the geosyncline, breaking it into a number of smaller basins. The Middle East region had four basins of sedimentation with Iraq-Iran basin as the dominant one. While Pakistan and Iran-Baluchistan basins were comparatively smaller. African Coast formed a narrow basin by itself. In the north, however, there also happened to be the Caspian Sea basin which is not being considered here. It is in these four sedimentary basins that the petroleum deposits of Middle East are concentrated. The late Tertiary movements plicated the sediments of these basins and provided a tectonic basis to the distribution of oil field. Remnants of the ancient Pre-Cambrian shields of Arabia and Deccan Plateau, however, imparted the general alignment of Tertiary folds of the region in the form of Zagros, Taurus, Oman loops and the sweeping curves of mountains of western Pakistan.

Geologically the central region i.e. (Iraq-Iran and Saudi Arabia) which is the main oil producing area falls into three distinct provinces :—

(*i*) The Ancient Massif Zone.

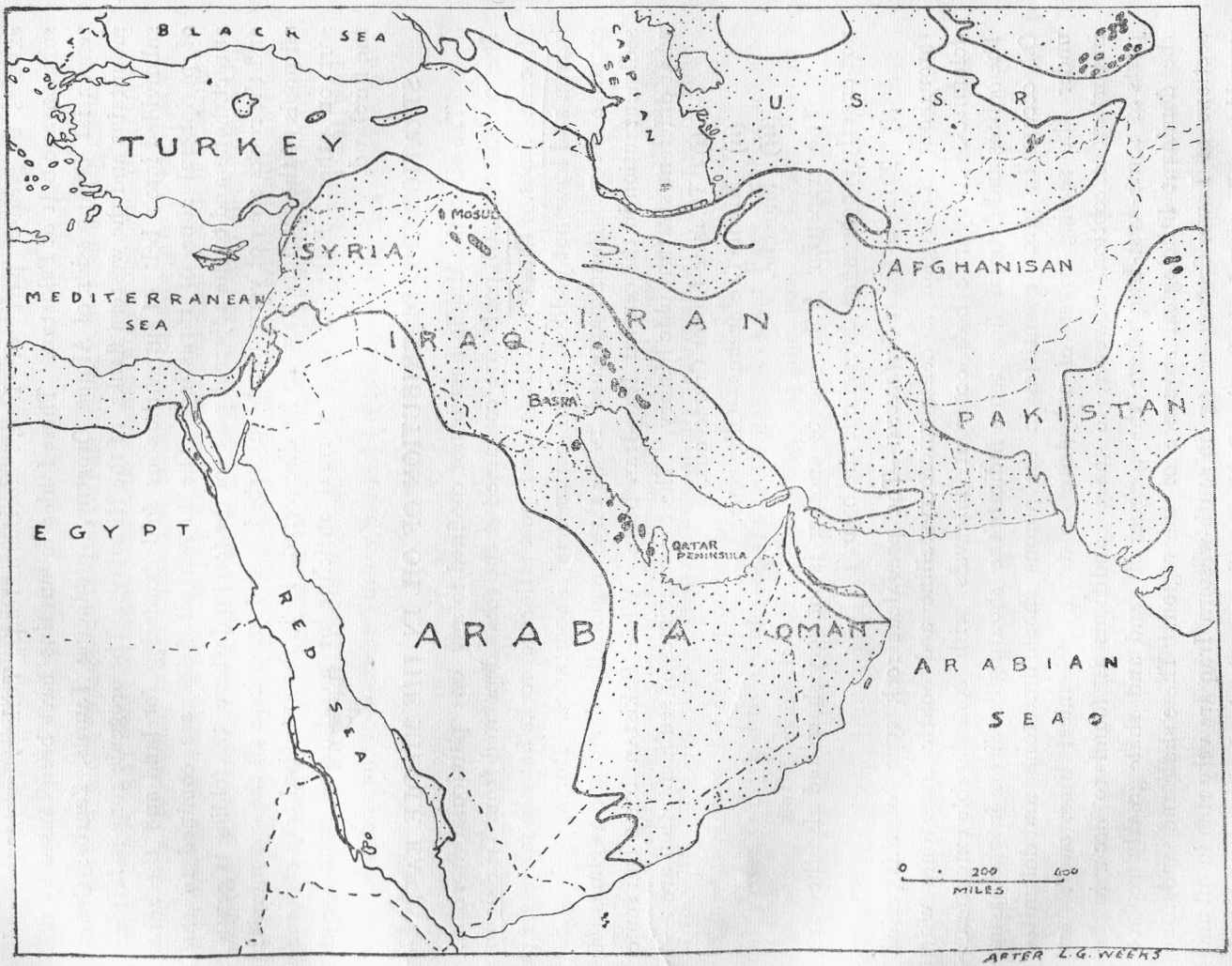
(*ii*) The shield of Arabia and adjacent lands.

(*iii*) The Orogenic geosynclinal zone.

1. *The Massif zone* :—The Massif zone of Arabia consists of Arabio-Nubian and Arabio-Somali massifs. It consists of intensly deformed igneous and metamorphic rocks of Pre-Cambrian age. The massifs determined the western and southern limits of the Middle East sedimentary basin. The concealed wedges of Deccan Plateau under the cover of Indus alluvium in Pakistan and the Arabian massif not only formed the boundaries of the basin of sedimentation, but also caused mountain loops to follow the present trend by acting as stable blocks during the time of Alpine Orogeny.

(*ii*) *The Shelf region* :—The shelf region is a vast desert tract adjoining the Arabian Massif. Gradual and intermittent subsidence marked with epicontinental deposits has been the main aspect of its geological history. Marine transgression produced tongues of marine sediments in the continental sandy deposits.

# SEDIMENTARY BASINS AND OIL FIELDS




AFTER L.G. WEEKS

(*iii*) *The Orogenic Geosynclinal Zone* :—This zone is very widespread and extends in greater part of Iran, northern Iraq, Turkey, montane and submontane belt of Pakistan. These folded mountains have been caused by the tengential compression of Alpine Orogeny, producing Taurus, Zagros. Oman mountains and the western flanks of the Himalays. The orogenic zone is further subdivided into a belt of autochthonous folds bordering foreland and the zone of paripheral zone of thrusting. The known oil fields are confined to the autochthone and to the adjacent part of the foreland where the folding is gentle and the rocks are not very much disturbed. And even here all the commercial oil pools of the Middle East so far discovered, lie in the anticlinal trap of some sort on other. Either it is a normal anticline or a saltdome structure in the foreland.

## STRATIGRAHIC DISTRIBUTION OF OIL IN THE MIDDLE EAST

The oil in the Middle East is not confined to any one particular horizon. The commercial oil pools are contained in the rocks deposited from Triassic to Miocene times. The pre-Triassic and post Miocene rocks have so far proved barren and have not yielded oil of commercial importance. During this wide expanse of time, there happened to be three regionally dominant regimes of sedimentantion in the central Iraq-Iran basin. While Pakistan basin had some what different stratigraphic history. The three regimes of sedimentation are :—

(*i*) Triassic-Lower Cretaceous.
(*ii*) Middle Cretaceous—Oligocene.
(*iii*) Miocene.

The transition from one to another is not very sharp and also they are not exactly synchronous throughout the basin.

(*i*) *Triassic-Lower Cretaceous*:—The prevalent rock type of this period throughout the region is dense microcrystalline and oolitic limestones with dolomites. Anhydrite beds occur at intervals with considerable extensions. The oolites and detrital limestones indicate the shoaling condition in the basin. Oil occurs in great quantities in the porous shoal limestone and dolomites under the sealing cover of anhydrite or dense "chemical limestone". An important exception, however, to these conditions is found to occur in the parts of south-west-Iraq where the tongues of sand and shale greatly replace the dominant lithological sequence of the region. These shale and sandstone sections of Lower Cretaceous age in south-western Iraq are very rich in oil and provide excellent pools. In Persian Gulf area oil occurs in the Arab zone of Upper

Jurassic age. More sporadic but potentially important oil pools occur in the Middle Jurassic rocks of east Saudi Arabia and northern Iraq. Triassic rocks of northern Iraq have also been found to be petroliferous.

(*ii*) *Middle Cretaceous-Oligocene.*—This period is marked by Alpine movements. Basin and swell structure became dominant throughout the region. Globigarina limestone, chalk, marl and shale predominate wherever, basinal environments persisted. But they pass into reef and shoal limestone complex indicating the shore line or shallow water condition created over the swells. Oil occurs prolifically in such reefs of Eocene-Oligocene age at Kerkuk (Iraq). Middle and Upper Cretaceous beds also show the development of such reefs. The Upper Cretaceous reef limestones contain commercial oil at Javan (N. Iraq) while Raman Dagh of south-eastern Turkey produces oil from Middle Cretaceous reef limestones.

Apart from the reef limestones, oil in notable quantities is found in the sand and shale sequence of Middle Cretaceous age in the Persian Gulf area. Bahrein Kuwait and Basrah oil fields derive their oil from such tongues of sand that project into the basin from the continental areas. Some other exceptions to the rule of reef limestone oil are also reported to be found in the region.

(*iii*) *Miocene* :—Conditions in the basin changed during this period. The sea receded and the basin became increasingly restricted with the result that evaporites (anhydrite) deposition became wide spread in the basinal environment. This period is marked by a widespread deposit named Lower Fars—a thick series alternating matls, evaporites and limestone. At the base of Lower Fars is Upper Asmari Limestone which passes basinally into evaporites and shales in the lower Persian Gulf region. Lower and Middle Asmari limestones of the region belong to Oligocene age. The Upper Asmari limestones are petroliferous and the oil rich fields of south-western Iran derive part of their oil from this horizon. But the greater part of the oil comes from the Lower and Middle Asmari limestone which lie just below them. Upper Asmari Limestone produces oil in commercial quantities at Naft Khaneh in eastern Iraq and also at *Qaiyarah* in northern Iraq. At both these places the possibility of Oligocene being petroliferous is ruled out as at one place it is absent while at the other it is all anhydrite. The limestone and the basal sands in the Lower Fars are potentially petroliferous in Basrah area and are supposed to contain oil in economic quantities. Deposits following Lower Fars Series are continental in nature and as such are non-petroliferous.

The oil fields of Pakistan occur in the outer fold zone of Himalayas in north-western Punjab. The oil has been tapped from Murree Sandstone series of Miocene age and also from the underlying Eocene limestone is thought to have been the source rock of petroleum in the region. Later the oil is thought to have migrated upwards into the porous Murree sands probably along fault planes.

The lowest stratigraphic limit of oil occurrence in the Middle East is reported to be Carboniferous in Ras Gharib fields of Egypt. Here the major production comes from sands of Carboniferous age. Some oil also comes from Miocene limestone and Cretaceous sandstones. In other fields the oil is obtained from limestone of Miocene age and also from Nubian Sandstone of Cretaceous age. Cretaceous shales and Miocene Globigerina marls are thought to be the source rock in Cretaceous and Miocene formations in Egypt. But the source of oil in Carboniferous rocks is not known with certainty.

## DIFFERENT OIL FIELD REGIONS.

The major oil producing areas in the Middle East are grouped in three units.

(1) The oil fields of south-western Iran.

(2) The oil field of Iraq.

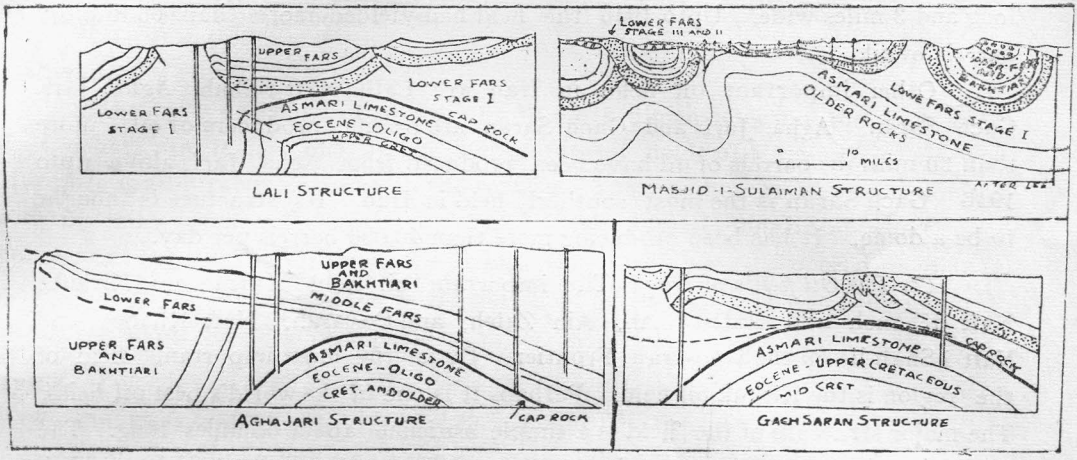
(3) Persian Gulf fields including Bahrein, Kuwait and Saudi Arabia fields.

Pakistani and Egyptian oil field regions occur on the eastern and western extremities of the region.

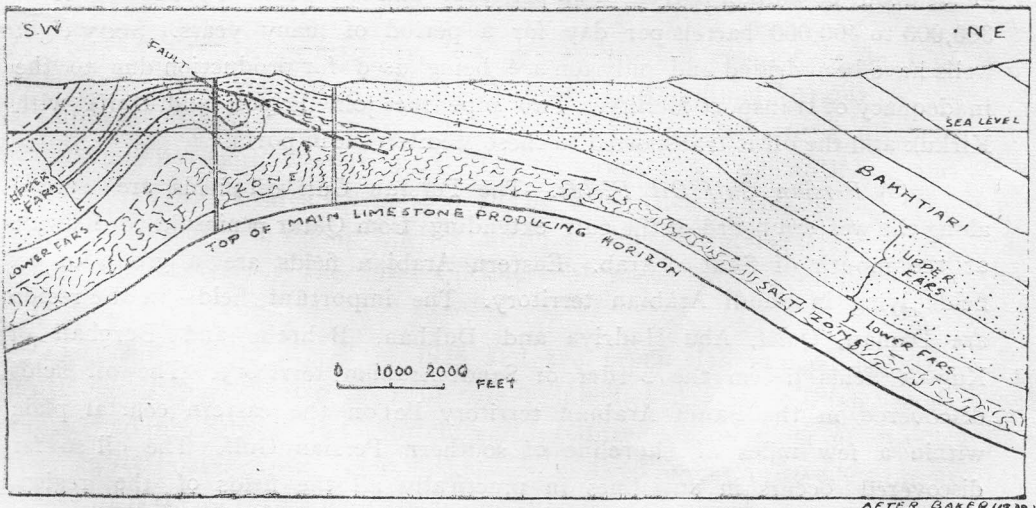
(1) *Oil fields of south western Iran* --Iranian oil comes from more than 67 wells and the wells are distributed in different oil producing fields. The following are a few important fields of the area.

(*a*) *Masjid-i-Sulaiman* :—The field was discovered in 1908 and is one of the largest oil field in the world. The present reserve is estimated to be 70 million barrels. Only one well is reported to have yielded 50 million barrels of petroleum from 1911 to 1926. The field has very interesting but complex structure elucidation of which is a triumph of geophysical method of prospecting. The oil comes from the sub-surface anticlines of Asmari limestone which are quite independent of overlying Fars Series which has been puckered due to the plasticity of Lower Fars Stage.

(*b*) *Haft Khel.*—It is about 40 miles south of Masjid-i-Sulaiman. The oil associated with it is contained in assymetrical anticlines. The surface




IRAN OIL FIELDS TPANSVERSE SECTION STRUCTURE




KIRKUK OIL FIELD IRAQ.

structure has no relation with the underlying sub-surface structure. The south western flank of the anticline is steep while the opposite one is gently dipping. Asmari limestone is the source rock. The productive areas is 20 miles long and 3 miles wide. Upto 1946 the field had yielded more than 66 million barrels of oil.

Other important oil fields in Iran are Lalli Naft-i-Shah, Agha Jari, Gach Saran. Agha Jari and Gach Saran are prolific producers of oil. More than 30 million barrels of oil have been produced from Agha Jari alone upto 1946 Gach Saran is the most southerly field in Iran. Its structure is thought to be a dome. It has been producing more than 40,000 barrels per day.

(2) *The Oil fields of Iraq.*—The important oil field of Iraq are Kirkuk, Naft Khaneh and Naft-i-Shah, Ain Zaleh, and Qayarah. Naft Khaneh and Naft-i-Shah lie on the Iraq-Iran Frontier. By far the most important field of the region is the Kirkuk oil field. Perhaps it is one of the world's best oil fields. The major structure of the field is a simple anticline about 65 miles long. The producing formation is Asmari limestone. The productivity of the field is partly governed by local fissuring of the limestone. The overlying plastic Fars Series and the thrust-faulting that occur at the top created some difficulties in the elucidation of underlying vital structure of Asmari limestone. The field yields about 33 million barrels of oil per year and is capable of producing from 300,000 to 400,000 barrels per day for a period of many years. Sixty eight wells have been drilled and only ten are being used for production due to the inadequacy of transport facility. Two pipe lines join Tripoli and Haifa with Kirkuk and the oil is transported to these Mediterranean ports.

(3) *Persian Gulf Oil Fields.*—The Persian Gulf oil fields are spread along the western board of the gulf extending from Qatar peninsula to Kuwait at the mouth of Shat-al-Arab. Eastern Arabian fields are a group of oil fields lying in Saudi Arabian territory. The important fields in the region are Daman, Qaitf, Abu Hadriya and Dukhan. Bahrein and Burghan of Kuwait fields lie on the border of Saudi Arabian territory. The oil fields discovered in the Saudi Arabian territory lie on the eastern coastal plain within a few miles of shoreline of southern Persian Gulf. The oil so far discovered occurs in anticlines in practically all the fields of the region. Damam has an oval dome structure with four and three mile diameters. The productive beds are zones of Jurassic limestone. Only in Abu Hadriya the producing beds lie 3,000 ft. further below Arab zone. Abaqaiq is also an elongated anticline over 30 miles long. The Saudi Arabian fields have been

the second largest producer of oil in the Middle East. They produced 26,905,000 tons of patroleum in 1950. The crude oil is refined at Ras Tanura and Bahrein. The greater part of crude oil is pumped by Trans Arabian Pipe line to Sidon on the Mediterranean coast.

**Bahrein.**

Bahrein is an island of 30 miles by 10 miles dimensions on the Persian Gulf coast. In it lies one of the important oil fields of Middle East. The structure is admirably exposed on the surface. The anticline is 7½ miles long and 2½ miles wide. The reservoir rock is the Jurassic linestone which is common in most of the Arabian Oil fields. The field was discovered in 1932 and produced 0.3 per cent of the world output of oil in 1949. The production at present is about 20,000 barrels per day.

**Qatar.**

On Qatar peninsula, south east of Bahrein island a big oil field was discovered at Dukhan in 1940. The Dukhan anticline is 50 miles long and 5 miles wide. The productive formations are middle Jurassic rocks probably equivalent, to Arab zone of Saudi Arabia. The production from first two wells had been 5000 barrels per day.

**Kuwait.**

Kuwait a small principality, lies on the western side of the head of Persian Gulf. It is bounded on the north by Iraq, and Saudi Arabia forms the southern undefined boundary. It has one of the worlds largest oil field at Burghan in its south western part. The structure is a large anticline and the proved productive area is estimated to be about five square miles. The productive measures are four thick sandstones bands occurring in the Lower Cretaceous Shale series. The total thickness of these bands is estimated to be 100 ft.

The field was discovered in 1938 and the production started in 1946. The average daily production in 1949 rose to about a quarter million barrels per day making Kuwait the third biggest producer of the whole of Middle East. The estimates of its reserve range from 9,000 million to 40,000 million barrels. It is the world's largest single oilfied so far discovered.

**Turkey.**

Ramandag is the only oilfield in Turkey. It is situated on the south-eastern corner of Asia Minor, near the northern border of Iraq and Syria.

The field has an anticlinal structure. It is 40 miles long and 7 miles wide. The reservoir rock is the top most section of Upper Cretaceous limestone. The oil was discovered in 1940 and the production was started in 1949. It has a potential daily production of 3,000 barrels. But due to lack of transport facilities the production is restricted to satisfy the local demands. An oil pipe line upto Mediterranean is contemplated.

**Egypt.**

Egyptian fields are located in a sedimentary basin which covers the northern tip of Africa. The fields are distributed in two distinct geographic divisions. The one set of fields lie on the western side of the Gulf of Suez on the mainland and the other on the eastern side of the Gulf in Sinai peninsula. The fields on the mainland are Ras Gharib, Ras Gamesa, and Hurghada, while on the Senai peninsula are Sudr, Ras Mataima, Asl and Wadi Fairan. The reservoir rocks of these fields range from Miocene to Carboniferous times. The structure in most of the Egyptian oil fields is anticlinal with the exception of Ras Gharib which has a faulted monocline. Ras Gharib is the biggest producer of oil in the country. Hurghada and Sudr are second in importance.

**Pakistan Oil Fields.**

Producing oil fields of Pakistan are all centred in the Jhelum and Attock districts of Punjab. The area lies on the outer fold zone of the Himalayas. Gentle folding is structural characteristic of the region. Important fields are Khaur and Dhulian in Attock district while Balkasar and Joya Mair are situated in the adjoining Jhelum district. Khaur oil field has a dome structure and the reservoir rock is Murree Sand-tone of Miocene age. The field was first drilled in 1869 and production started in 1915. Later on since 1920 increased production has been obtained by deeper boring and by 1938 it produced 3 million barrels of oil. In 1948 the production has been more than 16,000 barrels.

Dhulian is 10 miles south-west of Khaur-Dhulian anticline was discovered in 1935 and production started in 1939. It produced more than 1,00,000 barrels in 1948. The oil comes from basal beds of Murree series and also from Eocene limestone occurring at a depth of 7,700 feet.

Balkasar and Joya Mair anticlines are new fields. The oil is derived from Eocene limestone at a depth of 6896 feet at Joya Mair and at 8,200 feet at Balkasar. The production from Joya Mair has been 170,798 barrels in 1949, while Balkasar produced 201,693 barrels during the same period. Production in Balkasar started as late as 1946.

A natural gas reservoir has been struck at Sui on Sind-Baluchistan border.

## POSITION OF MIDDLE EAST OIL INDUSTRY

**Reserves.**

To ascertain the oil reserves of the world that lie deeply burried under the cover of sediments is one of the most difficult but interesting job of geologists, geophysicists and mining engineers. Everyday with the increase in knowledge of geology, the estimates of the world reserve are being modified. Every new field discovered adds its quota to the already known world pool.

The world's oil reserves are largely concentrated in several geologically favourable regions. As has been pointed out ancient sedimentary basins are most likely places for the formation and accumulation of petroleum. There are a number of such basins scattered all the world over, however, by far the greater part of world's oil reserve has been found to occur in the tropical and sub-tropical regions. The Persian Gulf—Caspian Sea basin and the gulf of Mexico—Caribbean basins account for at least 80 percent of the world's discovered oil. The Middle Eastern reserves are located mainly on the shores of Persian Gulf in Kuwait, Iran, Iraq and eastern Saudi Arabia. The Caspian Sea Coastal belt, Irano-Baluchistan basin are little explored. Pakistan and North African basins are partly known.

The proved reserves of the world are presently estimated to be over 96,000 million barrels. Of this according to the estimate of 1951, about 48,200 million barrels nearly one half are located in the Middle East. In 1949 the Middle Eastern oil fields claimed 41.63 percent of the total world reserve, whereas U.S.A., Caribbean Sea (chiefly Venezuela) and Russia had 35.19, 12.17 and 11.01 percents respectively The returns for the year 1946 show only 37.2 percent as the share of Middle East in the world reserve.

Of the estimated reserve of the Middle East, Kuwait and Saudi Arabian fields claim more than 50 percent of the area. Kuwait is thought to possess 33.74 percent, while the Saudi Arabian fields have 27.55 per cent. Iran and Iraq come next and share 21.06 and 15.17 percents respectively. Egypt, Bahrian and Qatar reserves constitute only 2.48 percent of total reserve of the area. Fabulous fields of Kuwait and Saudi Arabia figure even in the world estimate and claim a respectable position with 14.05 ond 11.47 percent of the world's total reserve.

These figures show a progressive increase in the world position of the Middle Eastern oil belt. This steady increase in the estimate is the result of

continued prospecting carried on by interested oil companies. However, comparing with the exploratory work done in USA the prospecting carried out in the Middle East is very scanty. The present estimate of the reserve has been arrived at by drilling less than 300 wild cat wells through out the region while more than 3,000 wells are drilled every year in USA alone. More intensive work holds much brighter prospects for future position of Middle East on the oil map of the world. In 1950 proved acreage of oil fields increased in Saudi Arabia by 60,700 acres bringing the total of 191,000 acres. In Iran it has gone to 161,000 acres by an increase of 18,000 acres. Major new discoveries have been made in Kuwait at Magwa and the first off shore discovery of the region in Saudi Arabia at Uthmaniah

Ever since the liquidation of Turkish Empire, Middle East due to its oil wealth became the hot-bed of intrigues and an object of jealousy among the world powers. After year of protracted deals and counter deals, a number of interests have emerged as having controlling positions in the oil map of the region. A few companies and their subsidiaries are operating in the region. British, American and Dutch have paramount positions. According to the Petroleum Data Book 1947, British and Dutch Control 52% of the reserve the United States share was 42%. Others had only 6% under their control. But after the nationalisation of Iranian Oil Industry and recent spectacular achievements of American interests in Arabia, the picture of ownership in greatly to be modified.

*Production.*—The production of oil in the Middle East on commercial scale started much later as compared with the USA, USSR, Romania and Canada. It was since the sixties of last century that those countries started producing oil. The production in Iran and Egypt did not start till 1911 and Iraq commenced production only from 1927. Bahrien and Saudi Arabian fields are late comers and their production started in 1938-1946 saw a very welcome addition in the form of Kuwait fields.

In 1928 the Middle Eastern oil fields were producing 3.6 percent of the world produce amounting only to 61,53,000 metric tons. In 1938 the production went upto 16 million metric tons bringing it to 6.4 percent of the world output. Since 1944 it has more than trebled reaching to 58 million tons in 1948, 71 million tons in 1949 and to about 88 million tons in 1950. With this rapid increase in the production in the post war world, the region has contributed 13.1 percent of the world supply in 1948 and 16.4 percent in 1949. While by the end of 1950 its contribution rose to about 20% of the total world production.

The production figures of the different oil producing regions of the Middle East do not bear direct relationship with their reserve positions. Iran though standing third as regards reserve has been traditionally the leading producer of the area. Saudi Arabia, Kuwait and Iraq come second, third and fourth in order of production. Iraq which used to be the second biggest producer till 1945 was pushed back by the prodigeous new comers. Out of the total of 7,11,55,000 metric tons (excluding production in Pakistan) of oil produced in the whole of Middle East in 1949, the percentage distribution has been as follows :—

38 percent were produced by Iran, while Saudi Arabia and Kuwait produced 32.9 and 17·2 percents respectively. Iraq produced only 6·1 percent. The rest contributed about 5·6 percent. If Pakistan's 1,11,140 tons are also included in the total the Pakistan share in production comes to about 0·15 percent only.

Ever since the production started in Iran, there has been a steady progress in the amount of output. The production was nearly trebled from 66,711 thousand metric tons in 1941 to 1,71,08,000 tons in 1945. The progress from 1946 to 1951 has not been less remarkable from 1,94,97,000 tons it shot upto 3,22,59,000 tons in 1950, bringing it to 36.3% of the total Middle East produced. In 1952 production, however, dwindled to 1.35 million tons due to the closure of Abadan refinery. Saudi Arabia starting with 67,000 tons in 1938, pushed its production to 2,87,200 tons in 1945. There has been a sudden jump to 82,60,000 tons in 1946 and even this has been trebled in 1950 when 2,69,05,000 tons of oil came from the fields. In 1952 production further rose to 40 7 million tons. In 1946 Kuwait entered the community of oil producers with a contribution of 8,00,000 tons of oil. 1947 saw this figure raised to 22,00,000 tons. By 1949 its contribution rose to 1,23,78,000 tons. In 1950 the total production amounted to 1,72,80,000 tons and in 1952 it has gone upto 37·9 million tons.

Production in Iraq though steadily increasing did not show any of the remarkable jumps shown by other oil fields of the region. In 1938 its production was 42,98,000 tons of oil. From 1938 there has been a steady decrease in production till 1941 when the production ebbed down to only 15,66,000 tons. However, this trend was reversed and all through the fourties there has been more or less a steady increase in production. By 1949 the production figures of 1938 was surpassed and the total output came out to be 43,26,000 tons.

During 1952 the production rose to 1,80,00,000 tons from 6.6 and 8.4 million tons of 1950 and 1951 respectively.

Egypt produced 12,21,000 tons in 1941, mainly for domestic consumption. Although there has been increase in production since then, but it has been far from spectacular. The production in 1949, came to only 22,45,000 tons which does not show a very big difference. Perhaps this is due to difficult geology and poor condition of Egyptian oil fields.

Bahrien production has increased from 10,99,000 tons in 1946 to 15,12,000 tons in 1950. During 1952 its production was 1.51 million tons.

Pakistan produces a very small amount of oil as compared with other Middle Eastern countries Its production can hardly satisfy even 1/3 of its requirements. Taken as a whole in the context of Middle East, Pakistan only produces 0.15% of the total production. In 1940, oil fields of Pakistan produced 767.3 thousand barrels of crude oil. In 1949 the production was 823.2 thousand barrels ; while in the years 1950 and 1951, the production rose to 1120.9 thousand and 1184.3 thousand barrel respectively. Expressed in terms of metric tons the production has been 111.1, 151.2 and 159.8 thousand metric tons in the years 1949, '50 and '51 respectively.

The production rate of the Middle Eastern oil fields is very slow as compared with those of USA. The immense reserve of billions of barrels in the Middle East is being produced at little over 1.6 per cent per year. The geology of the oil reservoir in the Middle East renders the maximum efficient rate of production for the region. Even with this low rate, the output with the present known reserve can be more than doubled.

The production in the Persian Gulf area almost doubled during the war largely as a result of Allied military requirements. Refining capacity was doubled in order to keep pace with the demand. In the postwar period there has been a rapid expansion of production from the Middle East. This has been made possible partly due to realisation of immensity of the reserve and partly due to inability of U.S.A. to satisfy its own internal demands and also partly due to the growing demand of the European market. Postwar changed economic conditions have also been favourable for the expansion of the industry.

Although there has been marked tendency towards the expansion of the industry in all its aspects during and after the war, the rate of development did not keep pace with actual requirements and the expectations. The limiting

factor in the expansion of the industry has been the postwar shortage of steel which greatly hampered the expansion of pipe lines and the tanker services. Dollar shortage has also added to the difficulties. To a certain extent the monopolistic control of petroleum interest has also tended to restrict the expansion so as to manipulate the price of petroleum in the world market.

**Refining of Petroleum.**

There are only 14 refineries in the whole of the Middle East, refining about 48 percent of the total crude oil produced in the region. The number of refineries in the Middle East is insignificantly small when compared with 677 refineries of the world. Although Middle East produces about one fifth of world's crude oil, the number of refineries comes to a little more than 2% of the world total.

Ever since the war there has been a considerable expansion in the refining capacity and the production of refined oil products in the region. At the end of 1948, there were 12 refineries excluding one in Pakistan with a total capacity of 9,40,000 barrels per day. While in 1947, the total daily capacity had been 8,30,000 barrels. And just before war the refining capacity was not more than one half of 1947. By 1950, about 319 million barrels of crude oil were refined as compared with 301 million barrels of 1949. But owing to sharp increase in the production of crude oil, however, .the Middle East refined only 48% of its crude production as compared with 57% in 1949.

The slowness of expansion in refining capacity has been due to the increased demand from U.S.A. and West European countries for crude petroleum of the Middle East rather than for its refined products. This has been as a result of expansion in the refining capacities of the countries and also due to the desire to help improve their balance of payments.

By far the largest refinery of the region is situated at Abadan. It has a processing capacity of 50,000 barrels per day, which is the highest figure for any refinery in the world. Other important refineries are situated at Ras Tanura, Kuwait, Haifa, Suez, Tripoli, Bahrien etc.

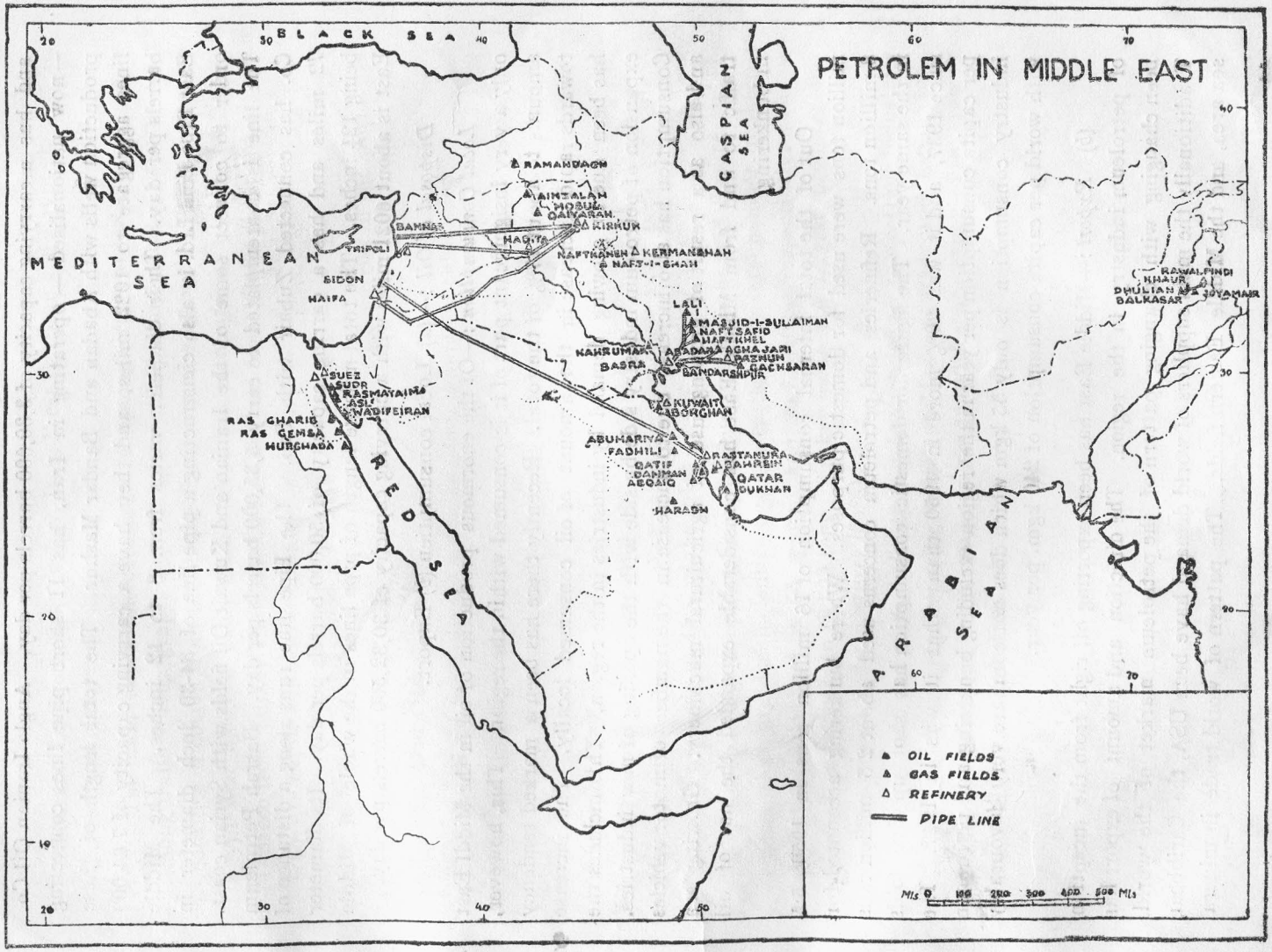
Abadan refinery which constitutes one half of refining capacity of the region is closed since August, 1951. Part of this refinery has resumed production since November, 1951, under Iranian control and produces about 1 million tons a year for local consumption. The refinery at Haifa, which had a refining capacity of 84,000 barrels a day is only partly working due to closure of pipe line from Iraq owing to Israel-Arab conflict. It is operating on imported

oil from Venezuela and had an input of 1.5 million barrels of crude oil in 1950. During the same year refinery at Bahrein showed an input of 56.9 million barrels whereas those of Ras Tanura and Kuwait had processed 38.4 and 7.8 million barrels respectively. Ever since the closure of Abadan refinery all of these three refineries have stepped up their output by about 50,000 barrels per day in order to off set the loss of production at Abadan.

**Pipe Lines.**

One of the main bottlenecks against the expansion of oil production in the Middle East has been the lack of adequate transport facilities to handle the crude oil produced. Oil is pumped from the fields to the port from where tanker loads are shipped to foreign markets. The chief ports which handle the export of oil are Haifa, Sidan, Tripoli, Baniyas on the Eastern Mediterranean coast and Abadan and Bandar Mashur in Iran, Ras Tanura in East Arabian Coast, Umm Said in Qatar and Bahrein on the Persian Gulf coast. The oil from the Persian Gulf coast has to go in tankers all around Arabian Peninsula and pass through the Suez after paying heavy charges. This long and circuitous route to European and western Hemisphere markets increases a distance of about 3,500 miles as compared with the distance from east Mediterranean coast. This increases the sea haulage charges, thereby creating a price differential of 66 cents per barrel between the price of crude in the Persian Gulf and that at Sidan on the Mediterranean coast.

A number of oil companies have constructed pipe lines connecting their fields with some ports on the Mediterranean coast in order to reduce the transport charges. Iraq Petroleum Co. Ltd. is pioneer in the field. The company completed two pipe lines in 1934 joining Kirkuk fields with Haifa and Tripoli ports. Both the lines were $12\frac{3}{4}$ inch in diameter and each had a daily carrying capacity of 43,750 barrels. In 1949 another pipe line with 16 inch diameter and a carrying capacity of 8,75,000 barrels per day was completed to supplement Kirkuk—Tripoli line. Another line to Haifa lies incomplete with a gap of 50 miles due to Arab-Jewish conflict. Another very important 30 and 20 inch pipe line joining Kirkuk to Baniyas in Syria with a capacity of 2,75,000 barrels per day has been completed. Arabian-American Oil Co. has six pipe lines connecting oil fields with Ras Tanura. Their combined carrying capacity per day is 7,91,000 barrels. A much bigger project has been completed in 1950 by Trans Arabian Pipe Line Co.—an American enterprise—by connecting Sidan with Arabian Oil fields. It is 30-31 inch diameter pipe line


PETROLEM IN MIDDLE EAST
BLACK SEA
CASPIAN SEA
MEDITERRANEAN SEA
RED SEA
ARABIAN SEA
RAMANDAGH
AINTALAH
MOSUL
QAIYARAH
KIRKUR
BANIAS
HADITA
TRIPOLI
SIDON
HAIFA
NAFTKHANEH
KERMANSHAH
NAFT-I-SHAH
LALI
MASJID-I-SULAIMAN
NAFT SAFID
NAFTKHEL
KAHRUMAH
BASRA
ABADAN
AGHA JARI
MIDHUN
BANDARSHPUR
GACHSARAN
SUEZ
SUDR
RASMAYAIMA
ASLI
NADIFEIRAN
RAS GHARIB
RAS GEMSA
HURGHADA
TO KUWAIT
ABORGHAN
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FADHILI
RASTANURA
DAHRAN
QATIF
DAMMAN
AEQAIQ
QATAR
DUKHAN
HARADH
RAWALPINDI
KHAUR
DHULIAN
BALKASAR
JOYAMAIR
OIL FIELDS
GAS FIELDS
REFINERY
PIPE LINE
Mls 0 100 200 300 400 500 Mls

and has a carrying capacity of 3,30,000 barrels per day. Anglo Iranian Oil Co. —now nationalised — operating in Iran, has 11 short pipe lines connecting production wells with Abadan and Bandar Mashur. The total length of these lines aggregate to 1022 miles, and they have a carrying capacity of 7,64,000 barrels per day. Their diameter varies from 8 to 12 inches. The Middle East Pipe Line Ltd. is also constructing a pipe line of 34-30 inch diameter in order to connect some of the Iranian and Kuwait Oil fields with Syrian coast. The line is contemplated to carry 5,35,000 barrels per day. Basrah Petroleum Co. has connected Zubair with Fao. The Pipe line runs along a distance of 72 miles and has a carring capacity of 50,000 barrels per day. Its diameter being $12\frac{1}{4}$ inches. The total mileage length of pipe lines in the whole of Middle East is about 6021 miles with a carrying capacity of 30,32,500 barrels per day.

*Disposal of Oil* :— (*a*) Local consumptien (*b*) Export.

*Local Consumption* :—Of the enormous production of oil in the Middl East only a very insignificant part of it is consumed within the region. This, however, amounts to about 17% of the total. Recently there has been a marked tendency towards rapid increase in the amount of oil consumed locally. The increase has been due to growing demand by industries in the region. This includes the expansion of petroleum industry side by side with the opening of new industries. Consumption has also increase due to increase in the number of motor vehicles and also as a result of growing use of agricultural machinery. Growing sea traffic to and from Middle East has considerable expanded the use of oil in bunkering.

Out of the total internal consumption of 16 million tons in 1950, 5·5 million tons were used for domestic purposes. Where bunkering accounted for 8 million tons. Refineries and petroleum concerns used about 2·5 million tons in the same year. The figure for domestic consumption has shot up five folds since 1937, and it was 20% more in 1950 than what it was in 1947. The per capita consumption per year in the region excluding bunkering and petroleum industry consumption is only 55 kgm which does not compare very favourably with world per capita consumption of 240 kgm. per year.

(*b*) *Export* :—Middle East has been exporting oil right from the inception of petroleum industry in the region. The direction and amount of export has been changing with changing pattern of the petroleum market of the world. Traditionally the main suppliers of world demand have been USA, the Caribbean sea area, and the Middle Eastern fields. The pattern of world trade in mineral

oil has greatly changed since the last war, as a result of sharp rise in the consumption of petroleum in USA and other European countries. Until very recently USA, that had been the chief supplier of oil in the world, especially to the European countries, has become the single largest importer of petroleum since 1949. And the Caribbean oil that used to go to Europe is increasingly being shipped to the markets of USA. As a result of this shift in the direction of flow of oil the importance of Middle East oil has been greatly increased. It has to meet the demand of a huge and expanding market of the whole of Western Europe.

During 1949, only two areas, the Middle East and the Caribbean emerged with exportable surplus of oil that went to meet the needs of world requirements. The position of Middle East oil in the world has been increasing steadily. By 1950 it has emerged as the largest exporter of the world leaving Caribbean Sea area as a close second. The export surplus of oil in the Middle East increased from 26 million tons in 1946 to 73 million tons in 1950. The corresponding figures for the Caribbean Sea area were 51 and 71 million tons respectively. Besides meeting its own increasing requirement the Middle East has met the main deficit of Europe and the Far East and Africa and also shipped some oil to N. America.

The total amount of crude and refined petroleum exported from the Middle East amounted to 540 million barrels (73 million tons) in 1950 as against 425 million barrels (57 million tons) in 1949. Of this only 28·5 million tons were refined while the rest 44·5 million tons were exported crude. There has been a sharp increase in the export of crude mainly due to the increasing demand of crude oil from recently expanded refineries of Europe.

During 1950, 44·5 million tons of crude oil were exported which showed a 50% increase on 1949 figures, while an increase of 40% has been recorded in 1951. The chief exporter of crude petroleum in the region are Kuwait, Saudi Arabia, Iran. Iraq and Qatar. Before the closure of Abadan refinery Iran was by far the largest exporter of refined products in the region. Saudi Arabia and Bahrien came next. Kuwait has also started exporting small quantities of refined products.

*Direction of Export* :—The greater part of the Middle East oil goes to Europe and America and only a small proportion finds its way to Indo-Pakistan sub-continent and Far East. The flow of oil is more to the west than to the east. Nearly 3/4 of Europe's requirements of petroleum are met from the

Middle East. France is the largest importer of Middle East Oil. 95 million barrels (12·7 million tons) were imported in 1950. U. K. comes next in the list with an import of 81 million barrels, while Netherland and Italy both imported 38 million barrels each during the same period. 12 million barrels were exported to Sweden, and U.S.A. imported 47 million barrels of crude petroleum from the region in 1950. During the same period export to Indo-Pak subcontinent amounted to only 2·8 million tons, while Australia imported about 4·6 million tons from the region. Africa including Egypt, Far East and South America received 8·2, 6·3 and 1·5 million tons of petroleum from the Middle East.

The demand for petroleum and its products is growing steadily and continuously. On the basis of the studies of the trend of demand in the pre-war days it has been calculated that by 1955 the consumption of petroleum in the world will rise to about 12 million barrels per day. With all the possible extension in the world petroleum industry, the burden which Middle East will be called upon to share excluding the estimated internal consumption of 250,000 barrels per day, will come to about 2,290,000 barrels per day. In order to meet the deficit of petroleum in the world, Middle East will have to expend its production of 1,045,000 barrels in 1948 to 2,540,000 barrels per day by 1955. With its immense reserve and comparatively less developed nature of present day oil industry, the Middle Eastern petroleum industry can face future with confidence and can rightly be expected to meet the challenge of time.

## POSITION OF OIL IN THE MIDDLE EAST ECONOMY

Considering the importance of oil in the economy of Middle Eastern countries, it is sometimes suggested that oil and the Middle East are synonymous in parallism with the saying that Nile is Egypt and Egypt is Nile. This, however, seems to be an over optimistic and exaggerated picture. The development of petroleum resources of the region has certainly made a definite contribution to the economy of the Middle Eastern countries. However, the extent and scope of contribution varies widely from country to country. Apart from the abstract contribution in the form of contact with the highly organised western standards of industry and civilisation, the direct benefits from the petroleum industry come in the shape of royalties paid to the government, employments offered to the local population and the extra contribution of money from local purchases and last but not the least are modern amenities provided by oil companies in their establishments.

It is interesting to note that most highly developed countries like Egypt, Turky and Pakistan hardly derive any revenue from the oil industry. It is only in the less developed countries in the Middle East that the oil industry is developed on a much bigger scale but the technological gap between the industry and the local condition is so wide that very little benefit is derived from the existence of so highly developed industry in the country. The countries deriving substantial benefits from the oil operations cover only 30 per cent of population excluding western Pakistan. And of these only O. 34 per cent are directly employed in the industry. The revenue derived from the oil also does not account for more than 15 per cent of the national income in the greater part of the region except for very small principalities like Bahrein Kuwait etc.

The income derived from the oil has lately shown a sharp increase due principally to the changes in the terms of contracts and also due to expanded productions. Iran's total earning in foreign exchange from oil increased from 526 million rials in 1943 to 1284 million rials in 1949.

Iraqi Dinar = 1 £.

128 Rial (Iran) = 1 £.

65 Rial (Saudi Arabia) = 1 £.

1 Rupee (Pakistan) = 2 sh. 1—15/16 *d*.

Of this only one third were received in the form of royalties. The income from oil, formed only 14.9 per cent of the total revenue of the year. In Iraq the royalty constituted only 11.5 per cent for the same period and amounted to 3.12 million Iraqi dinars. Saudi Arabia received 106 million dinars as royalty in 1948 and this amounted to 49 3 per cent of the total income. It is reported that there has been a sharp rise in the total amount of royalties received from 66 million dollars to 155 million dollars from 1949 to 1951. In 1952 it amounted to 170 million dollars.

The earnings derived from petroleum in Kuwait and Bahrein are unusually high. The income from other sources is insignificantly small as compared with one derived from oil. Bahrein's royalty increased from 1.6 million dollars in 1849 to 3.2 million dollars in 1950. While Kuwait received 2.8 and 3.9 million dollars in the same years. Income of Kuwait has tremendously increased between 1951 and 52 and the amount received has risen from 30 million dollars to 140 millions.

In order to carry out the operations of petroleum industry, the companies employ a number of men from the region. The number of local

people employed is about 1,00,000 which forms only 0.34 per cent of the total population of the region excluding western Pakistan The majority of the local employees are engaged in non-technical jobs. Of late companies have started striving to give technical training to selected local people to be employed in more responsible jobs. At present the local employees form about 84.6 per cent of total personnel of the industry. The above quoted figures show that here too a very small fringe of population is benefitted.

Although the amount of royalties received by the countries of Middle East do not form a big part of national income, they bring in valuable foreign exchange to the countries. Very often than not foreign exchanges are utilised for balancing the budgets of hard pressed governments. In some cases a part of earning is utilised in public works. Recently the local governments have started using money in developing water resources, means of communication, harbour facilities and developing sanitary conditions in the towns.

Patroleum is an exhausting natural asset of the region. The future prosperity of the area depends to a great extent upon the proper utilisation of the benefits derived from the petroleum industry. The money should be put back in developing other natural resources of the region so that a more balanced economy may be developed. And the region's apparent prosperity may be put on more permanent footing. Small scale industry utilising the local cheap fuel should be developed to bridge the technological gap that exists between the highly developed petroleum industry and the under developed agricultural-cum-pastoral economy of the region. If, however, in future the development takes place the region stands to gain more from the oil industry by meeting the subsidiary needs of the industry which at present is met from outside.

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**Abbreviations** :—

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| Q. J. G. S. | ... | Quarterly Journal of Geological Society (London). |
| Rec. G.S.P. | ... | Records Geological Survey of Pakistan. |
| Rec. G.S.I. | ... | Records Geological Survey of India. |
| Mem. G.S.I. | ... | Memoirs do. |

# TRANSPORTATION IN THE MIDDLE EAST

BY

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Situated at the focal point of three continents, the Middle East has been a natural focus of land and water routes since prehistoric times. Barring the early development of civilization in China, the area for centuries was the centre of the ancient world, and major commercial routes centred upon its cities and empires. Later the region became pheripheral politically to Greece and to Rome, but the importance of its trade lines, both on land and sea, continued. With the rise of Islamic power, the Middle East again came to hold a central position in world transport, serving as a focal point in the commerce of the Moslem area, and in the transit trade between Europe and the Far East. Today, however, the transport position of the Middle East is interstitial in relation to world communications, and locally inadequate to national and regional needs. Since the density of transport in any region is proportional to the resource and economic development, it may be concluded that the Middle East possesses considerable unutilized potential.

From a global aspect, the Middle East is crossed by the world's second-most important water route. This route, which passes from Europe through the Mediterranean and Red Seas to the Indo-Pakistan Peninsula and the Far East, has surplanted the land and water traffic which in ancient and mediaeval times enriched the Middle East. A capture of trade by European merchants followed the establishment of direct commercial contact between the West and the East after the discovery of the Cape Route around Africa by the Portuguese in 1498, and resulted in the elimination of the Middle East as an intermediary. The construction of the Suez Canal in 1869 shortened the water line of communication between Europe and the Far East, but since the Middle East lagged economically, its commercial position began sub-marginal. While this trend is now breaking, a large part of the area remains little affected by the fact that one of the world's major sea lanes passes its front door. Within the area, only Turkey, Pakistan and Israel have merchant marines which utilize

world seaways. Israel in particular, because of high relationship between population and area, is seeking to expand its shipping to serve as carriers for other nations, thus adding to national income. But, while in generalization, the Middle East countries make little use of the world water ways, local coastal shipping is of high importance. Also, because of the significance of the global route passing through the area, the Middle East has a high political and strategic importance to outlying nations whose prosperity and security are dependent upon sea lanes.

While global water routes bisect the Middle East, aviation has made the area a crossroads. Air routes focus here from Europe, Africa, and North America and from southern Asia and Australia. Such cities as Beirut, Cairo, Bagdad, and Karachi with their modern airports have assumed international importance in the world's air lanes. This significance results primarily from the Middle East being a junction of continents, but it is also aided by the general prevalence of good flying weather commonly associated with arid and semi-arid climate. The trans-world air lines crossing the area are linked with national air lines in the various countries. Some of these interlocking lines, as with Orient Airways of Pakistan, have limited international connections. In generalization, the national lines are recent developments, and have not yet fully expanded into their potential in relation to routing, service, and volume of freight and passenger traffic At the same time, it must be recognized that the potential is limited as compared with more highly developed economic regions. Since the density of scheduled air flight is greatest in urbanized areas, the Middle East with its large agricultural population has a limited basis for the expansion of air lines. While aviation, both on a global and local basis has expanded enormously in the Middle East in the last twenty years, it does not draw greatly on the area, nor has it greatly enhanced the area's commercial importance, but, as in the case of water routes, it has greatly increased the region's political and strategic significance.

The rail systems of the Middle East forms a loose discontinuous net which constitutes about $2\frac{1}{4}$ per cent of the world's total rail mileage. The several systems are inadequate for the needs of the local national states and for the region as a whole. While four lines traverse the region from north to south—from Turkey to Egypt :—from Turkey to the Persian Gulf ; from the Caspian Sea to the Persian Gulf : and from the northern to the southern portion of West Pakistan—there is no trans-regional line from east to west. This definitely handicaps the region both commercially and strategically. Solution to the problem is more than a matter of interlocking the skeletal spurs of

present existing lines, since this would result in indirect and time consuming connections.

A second disadvantage of the Middle East rail pattern is its general lack of ties with surrounding regions. The only fully open link is at present between Turkey and Europe, although partially-operative connections exist between West Pakistan and India, and non-operative connections between Turkey and Russia and Iran and Russia. On the west Egypt is unconnected with the remaining countries of Africa. Thus the rail system of the Middle East forms an isolated pattern apart from other regional areas.

A third general disadvantage of the Middle East rail systems arises from partial construction by foreign interests. In accordance with the general political theory of the late nineteenth and early twentieth century, the early development of rail lines in the Middle East was sponsered by foreign capital linked with European political and commercial interests. Thus the British laid lines in Iraq, the French in Syria, and Germany with its "Drang nach Osten" policy planned a Berlin-Bagdad route. As a result lines were constructed where profits would prove the greatest, and the railroads of the Middle East were regarded as fringe spurs from Europe. Later, as in the case of Turkey, when the national government secured control of the lines and sought to connect the construction the end result was deficient for national needs. Also construction by varied outside interests resulted in lines of different gauges, so that interconnections between lines are difficult and expensive. Some countries such as Iran were able to capitalize their own rail system, but this did not always result in stand trackage and equipment throughout the national area. In most cases, the rial lines of the Middle East show a fairly close correlation with population density as might be expect. This is particularly true in Egypt where over 90 per cent of the population for ns a ribbon of settlement along the Nile. Arabia and Afghanistan, however, possess no railway lines.

The roads of the Middle East are extensive in mileage but lacking in quality. Most of the roads are little more than intervillage tracks or trails which restrict easy communication, make difficult the passage of produce and trade goods, and do little to relieve the isolation of the settlements. All the countries with the exception of Arabia and Afghanistan have loose systems of all-weather motorable highways connecting the primary cities. These roads have been planned on a national basis and do not provide good inter-regional connections between the various countries. Also, most of them are of insufficient width and not properly engineered for curves and gradients to carry the fastest modern traffic. Road contruction throughout the area has been handicapped

by a lack of capital, and in the large alluvial plains such as that of the Indus, by a lack of stone for road beds. In spite of the general inadequacy of the roads, bus transport for the movement of passengers and freight is of particular significance. It would appear that the countries in the area may skip the era of extensive railroad building in favour of motor transport. This is all the more feasable in view of the improvement of automobiles for travel in arid and semi-arid regions, and the use of special tires for travel over sand.

The aridity and semi-aridity of much the Middle East results in a general absence of streams suitable for navigation. The larger rivers are exotic in character, and serve the primary function of supplying water for irrigation. This, along with seasonal changes in the volume of flow and the presence of dams and weirs, has hampered the development of transport even on the longer and larger streams. For the most part, river transport is conducted over localized stretches by specialized craft adapted to swiftness of current in the upper reaches of the stream, and to shallowness of water in the lower streches flowing over flood plains. This makes necessary the unloading and reloading of freight from one type of craft to another at points where the character of the river changes. Thus on the upper Tigris and Euphrates Rivers, timber rafts supported by inflated animal skins are used to carry goods to downstream terminal points. These craft are then dismantled and carried back to their starting point by pack trains since swiftness of current will not permit movement upstream, while the freight is reloaded unto small steamers and barges of slight craft for transport down-river. In spite of these handicaps, the rivers of Iraq carry a greater amount of traffic than do the roads and railroads. Transport on the Nile is less restricted to local areas, and assumes a national movement. Steamers and barges transport more than 80 per cent of the cotton of Upper Egypt to commercial centres on the lower Nile, while an increasing amount of goods are passing from rail to river transport.

In conclusion, the transportation of the Middle East is inadequate for the fullest commercial and strategic interests of the area. The problem of national and inter-regional communications in the area is not solely a matter of the extension and improvement of the present routes. Justification for addition capital expenditure for lines of transport is dependent upon increased productivity. Regions which are low in production often remain isolated and served by poor communications long have such transport forms disappeared elsewhere. Thus improvement in transportation is also a problem of increasing productivity to a point making possible the betterment of transport facilities.

# UNITY OF THE MIDDLE EAST

BY

K. U. KUREISHY.

There are almost as many dissimilarities as there are similarities in different parts of the Middle East. Some of the dissimilarities are traceable in the complexities of structure, racial differences and, above all, the varying dynastical interests of the rulers of Middle Eastern countries. Under the institution of monarchy, which has for long been established in most of these lands, there has been very little progress of democratic thought in the region. It has retarded the process of evolution of progressive ideas which are conducive to a greater understanding between countries and countries. It is at the same time an interesting fact that the very politico-economic considerations call for a greater unity of the region under the changed conditions of the world politics. *The purpose of the paper, therefore, is not so much to trace out the existing bonds of unity as to see if a case could be made out for unity.*

In the recent past disunities had gained ascendency over unities. It appears, however, that with the march of time the need for an ever increasing unity will be more intensely felt. At the same time the concept of unity is not altogether devoid of 'historical sanction'. In the past most of the region was dominated by two great powers *viz.* the Ottoman Empire and the Persian Empire. Ottoman Empire attained colossal dimensions in the days of Sulaiman the Great. Leaving aside its expansion in Europe, the Ottoman Empire at that time enclosed within its realm Al-Maghreb (Mediterranean lands of North Africa), Egypt, parts of Arabia, Mesopotamia, Syria, Lebanon, Jordan, Israel, Armenia and Anatolia. European imperialist policy was directed against this historic unity of the region which was ultimately split into its present component parts.

It is unimaginable to have a unity of the historic type now under one or two suzerainties but at the same time it is clear that the present political diversity is not very deep rooted in history. Secondly the common problems of defence of the region and the pooling up of its economic and financial

resources for the progress of the region are supreme considerations for bringing the divergent power groups nearer coherence and unity of thought and action. Olaf Caroe seems to advocate such a unity when he writes in his book Wells of Powers.*

"The needs are clear—a regional system for the utilization of the profits of oil, a regional programme for the organisation of labour, an international framework for the defence of the region as a whole, these three. They are component needs, which, converging, constitute a political problem of the first order."

The natural oneness of the Middle East is best established by very similar climatic, vegetational, demographic, linguistic, religious cultural and occupational similarities of the whole region. General dryness is the keynote to understand the climate of the region. There are some exceptions to the rule but these do not include very extensive areas. In some parts desert conditions are ameliorated by Mediterranean or Monsoonal influences. The exceptional areas where annual rainfall is more than 20″ are (*i*) Himalayan foothills and northern plains of West Pakistan, (*ii*) Caspian Seaboard in Iran (*iii*) Some higher parts of Yemen and (*iv*) the Black Sea, Aegian Sea and the Mediterranean Sea coasts where the 20″ isohyet runs approximately parallel to the shore at a distance. In most parts of the Middle East countries rainfall is below 20″ and in southern parts of West Pakistan, Iran, almost the whole of Arabian peninsula and Egypt it is less than 10″. The effect of the general aridity of the region is accentuated by the length of dry summers and the pronounced variability of rainfall from year to year. Excepting in Arabia, another climatic link between different countries exists in the form of winter rainfall of Mediterranean character. Almost everywhere winter rainfall is more than 5″ and varies between 5″ to 10″ and more.

In a region of high temperatures and consequently great evaporation the amount of rainfall is generally most deficient. It has resulted in a particular type of flora characteristic of desert and steppe lands widely dispersed over vast areas of the region. Agriculture is similarly influenced by the climatic conditions. Over vast areas rainfall is quite inadequate for the successful growing of crops. The need for irrigation is one of the most important problems of the region and there exists a very close relationship between agricultural activities and the availbility of water either from subterranean sources or

*P. 144

from surface flows. Crop farming and human settlements are highly localised in areas where water is available. The effect of topography which is so important in determining human activities is not so dominant in the region. Man's adaptation to climate and vegetation is manifest in the similarity of occupational groups further resulting in the similarity of social structure. Peoples of these lands are mostly engaged in agricultural cum pastoral pursuits. Industries are unimportant. Whatever industries exist are mostly in cottage stage. Mineral oil extraction is almost wholly a foreign enterprise and its effect on the overall economy of the region is at present limited. The percentage of agricultural population for the whole region is as high as 75. In almost all the countries of the Middle East this percentage is very closely maintained. The percentages of population directly dependent upon soil in some of these countries are as below :

West Pakistan 70, Turkey 70, Iraq 75, Iran 82, Jordan and Israel 70 and Egypt 75.

The dependence of a remarkably uniform percentage of population on agriculture is a noteworthy feature in itself and has further repercussions in determining a similar social pattern over the distant corners of the region. The farm practices, the methods of cultivation, the nature of implements, the stage of development of agriculture and the traditionalism of the farmer confronted with the same problems of aridity, high salt contents in the soil and small holdings and his own aversiveness to change, are characteristically common to the whole region.

An underdeveloped agricultural economy of the region has resulted in the establishment and the sustenance of the fundal order of the society and vice versa. Everywhere in all the countries of the Middle East the differences between the landlord and the tenant are faithfully maintained. Differences also exist between the town dwellers and the rural inhabitants, the sedentary agriculturists and the nomadic pastoralists, methods of irrigated agriculture and dry farming etc. The design and style of these differences is so uniform all over the region that it simply conforms to the natural unity rather than adds to the diversity. The common religion of the overwhelming majority of the populace and the predominant influence of Arabic over other languages of the region further determine the considerably common mode of thinking and behaviour of Arabs, Egyptians, Iranians, Turks and Pakistanis alike.

For defence and strategic purposes the unity of the region is felt so much so that the very evolution of the name 'Middle East' in its present meaning (excluding West Pakistan and Afghanistan) is largely the outcome of military developments during the second World War. The region stretching from the northern coastal areas of Africa to Iran was treated as a single block of territory for military purposes.

Its position as a bridge between Europe, Africa and Asia has been of permanent strategic importance in the past and it has in no way been lessened today. Apart from the long and circuitous Cape of Good Hope route there have been two main links between Europe and Asia. One is the land route which passing through Levant, Turkey, Iraq, Iran Afghanistan etc. reaches the Indo-Pakistan sub-continent or alternalty utilises the Persian Gulf from Iraq to Pakistan. It acted as a bridge of Aryan civilization between Asia and Euorpe in the distant past. Similarly it brought the Greek influences to India. In the comparatively recent past some parts of the region played a decisive role in the successful conduct of the two world wars. Mesopotamian campaign of the Allies was necessitated in World War I and their activities in Syria, Iraq and Persia specially the last named country proved of far reaching consequences in World War II.

The north-south railway line of Iran was utilised as the most important supply line to Russia. It was with a view to negativate the replenishing effect of the Iranian route to Russia that Germany had to concentrate on the unaccomplished task of occupying Stalingrade so that the Volgat-Caspian line of communication which connects Iran with central and northern Russia could be cut off. So great was the effect of this Iranian opening to U.S.S.R. that had it not been for this life line Russia would have been in a difficult situation and the war strategy of the Allies would have been seriously affected. Even to-day the position of Iran as a direct gateway to Russia and on the other hand the location of Iran and West Pakistan as the only avenues leading to the warm waters of the Indian Ocean are unparalleled anywhere else in Asia. The position of Turkey as the custodian of the Black Sea—Aegian Sea passage is well known but even that country is strategically much less important as compared to Iran and Pakistan as it, at best, gives Russia an access to the Mediterranean which is only an 'enclosed sea properly guarded at Gibralter and Port Said and further reinforced at Aden.

Since the construction of Suez Canal the Mediterranean-Red Sea highway has obviously been much more negotiated than the land route. This sea route is of great significance to the Orient as well as to the Occident both in peace and in war. It furnishes such a powerful link between the East and the West that the two can be said to meet here. It is one of the busiest commercial highways of the world passing about 55 million tons of cargo annually. In a global war its utility is even greater. The Cape Route being much longer acts as an exterior line of communication and is at best utilised as an auxiliary supply line at times when time factor becomes the greatest or even the only consideration.

In case of a possible future war between the present hostile power groups of Russia and the Western countries the seaways will remain as indispensible for the latter countries as these used to be in the past.

Kingston—Mcloughry has elaborated the concept of the insular character of the Commonwealth in his book War In Three Dimensions.*

" ..... ...leaving the Indian sub-continent out of account, the Canadian frontier with America is the only significant land frontier in the Commonwealth and it has for long been the only frontier with a great power. The U.K. with the Republic of Ireland, forms a purely insular group of territories on the eastern side of the North Atlantic. Central and South Africa may be taken to represent, on a large view, a Commonwealth island although considerable areas are held by European powers and others are autonomous, for it is separated from the rest of the world by the oceans and by the belt of desert which extends right across the northern half of the continent. In the area between Africa and the major territorial groups in south-east Asia and Australia are a number of islands or virtually islands, that is to say, Perim, Aden and Socotra, Ceylon and the islands of the Indian Ocean. The South-East Asian group, comprising Malaysia, British Borneo and Hong Kong is separated by the Dutch and Portugese East Indies from that comprising Australia, New Zealand and the territories of New Guinea, and in the Pacific Islands further east. In all these Asiatic and Australian parts of the Commonwealth the only continental frontiers are those of Malay with Siam and Hong Kong (Kowloon) with China".

The oceanic character of the Commonwealth territories and its wide dispersal still maintain the dire necessity of the freedom of the seas which has

* pp. 119—20.

for long been the cornerstone of British policy. In the past it was possible to maintain such a freedom of the seas by establishing a marginal control over the surrounding territories and having useful political relations with the countries concerned. It was made feasible in the presence of a strong base like the Indian Empire. In case of the self determination of India, Pakistan and Burma this position has been weakened. Secondly, the development in the technique of warfare in modern times has much increased the importance of depth in defence. The significance of the Middle Eastern countries bordering the life line of the Commonwealth and of the democratic world in general has, therefore, increased manifold.

The protection of this life line between the East and the West from a possible belligerent power shall have to take into cognisance the whole of the Middle East. It is because there usually exists a region of 'partial defence' between the belligerent power and the areas of complete or 'absolute defence'. In the demarcation of the possible line of absolute defence beyond which the territory is, in any case, to be denied to the invader, the extent, nature, co-operative will etc. of the intervening territory of partial defence is to be reckoned with.

The giant region of 2.96 million sq. miles of unimproved spaces provides a deep zone of defence the crossing of which has always been difficult. In case of a grouping of the many states of the Middle East into a common defence plan these spaces are still difficult to negotiate. The lack of means of communication and the dryness of landscape, demand of a specialised type of warfare in the region. The hardiness of the 126, 547, 380 inhabitants of the region imposed on them by the natural rigours of life and their energetic and dynamic habits are a definite asset in its defence.

Inspite of the very thin density of population, about 43 persons per sq. mile, the deserts are bubbling with activity and energy. Nomadism both horizontal and vertical, vertical in the form of transhumance, is responsible for inculcating in them most dynamic habits which if properly harnessed give as best results as those which were obtained at the time of the most speedy spread of Islam from the Atlantic Ocean in the west to China in the east. The idealogy of the people, their religion, is as resistent to the foreign influences in general and communistic influence in particular as the inhospitable environment itself. The empty spaces of the interior of the region with dispersed population are resistent owing to their very emptiness. There is more life and activity on the margins

*e.g.*, in Pakistan, Iran, Turkey, Egypt etc., but these happen to be in the zone of maximum cultural development in the east and are naturally aversive to a change.

Progress of air navigation has added much to the strategic value of the Middle Eastern region. It forms the trunk route between the West and the East and sends off air routes southwards to Africa. The presence of deserts necessitated air transport between Egypts and Mesopotamia during World War I and the Royal Air Force was, in this way, the harbinger of civil aviation.

So great is the bearing of the development of air navigation on the region that Olaf Caroe basing his argument on Toynbee's views infers that the shifting centre of civilisation is going to be located somewhere near Shat-el-Arab in future. The centre was located at Farghana in the days of land routes. It shifted to London in the days of sea navigation and has now shifted to Washington. Where is it going to come to rest in the Air Age largely depends on the relative importance of different regions. If Europe and America remain the only important regions, which is not going to be the case, then Iceland is to occupy that position. According to Toynbee its location depends not so much on physical but on human geography. "..... the centre may come to rest at a point roughly equidistant from the two poles of world population, the western pole in Europe and America and the eastern in Asia."* The coincidence that oil is located in one of the most important air bridges of the world is a matter of far reaching significance. The usefulness of petroleum in wars is so great that it is no exaggeration to say that, atomic energy apart, he who possesses petroleum wins the war. And the region accounts for about 20% of the total world production with more than 50% reserves.

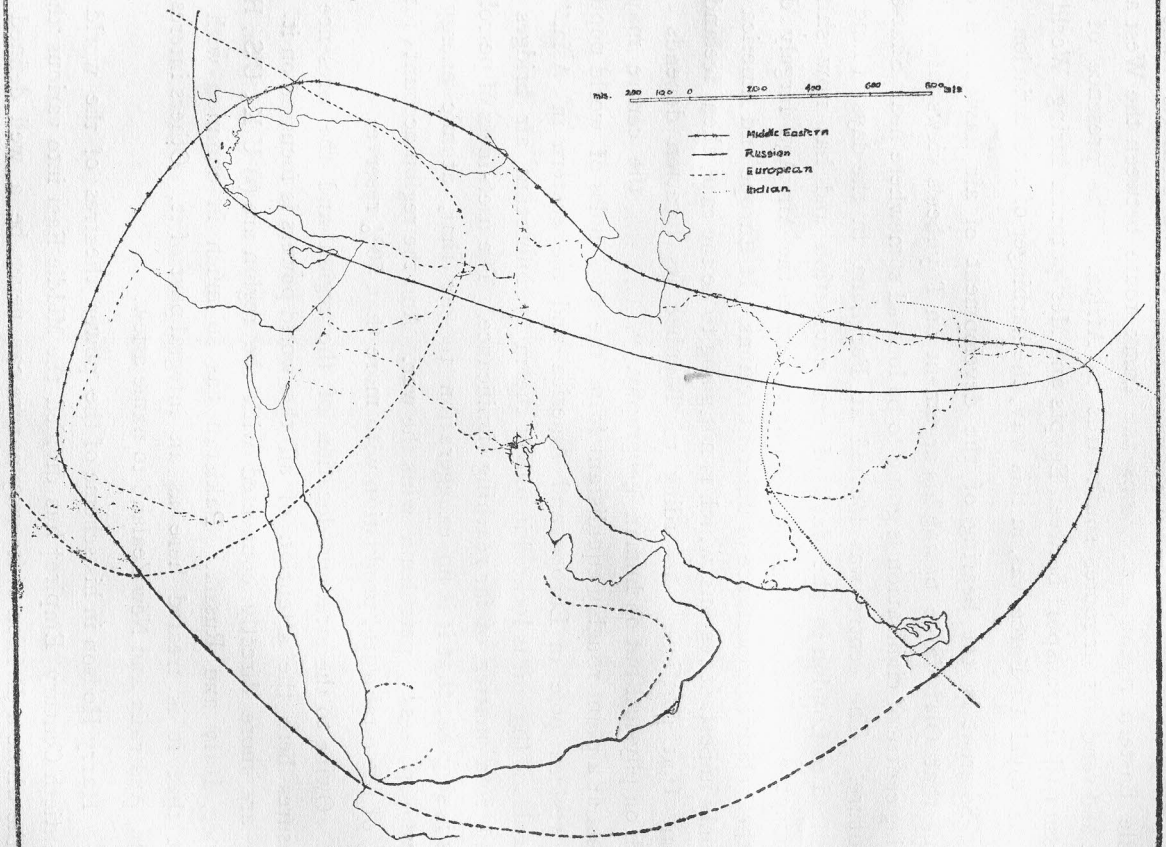
Owing to the strategic location of the region and the presence of oil measures here the attention of all the world powers is focussed on it. Those who are more directly connected with the region are (*i*) U.K., U.S., Holland, France, Italy and Russia. Pakistan has so much in common with Middle East that it is treated here as an integral part of it. Others interested are India, Australia and New Zealand to name a few.

Harry Hodson in his scheme of the power theatres of the world in the Twentieth Century Empire† has divided the Middle East into various 'theatres'. On the whole a division of its very nature can never be a well defined one as

*Quoted in Wells of Power by Olaf Caroe, p. 174.

†Map reproduced in Wells of Power.

# POWER ZONES OF MIDDLE EAST




MODIFICATION OF HARRY HUDSON'S MAP IN TWENTIETH CENTURY EMPIRE.

it is impossible to delineate abstract interests and to determine their degrees. It, however, does bring out the fact that there are more than one interest at work and that the interest spheres considerably overlap each other giving rise to tension and possible conflict. The theatres of power referred to above are quite generalised as these are drawn on world basis.

The division of the sub-continent into Pakistan and India has brought about some modifications in the pattern of these theatres in Middle East. The modified map is given here under the title of 'power zones of Middle East.' The power zone of Eurpean or more correctly western powers may include the whole of Middle East but only the areas of greater interest are shown under it. Similarly if Russia is ever to be considered as an expansionist power the present delineatian of her zone of power is very miserly but her direct contact justifies the inclusion of the areas shown. The case of India is unique in defying a proper demarcation of her interest sphere. Towards west her interest in Kashmir and Afghanistan is more clearly manifest although it vaguely extends upto Egypt. West Pakistan's inclusion in the Middle Eastern zone is quite natural and can be substantiated on more than one bases.

The natural grouping of Middle Eastern countries into one power bloc is justified not only by the compactness of the region or the uniformity of climatic and other natural and social conditions but also by the economic and defence exigencies. Greater unity will ensure greater political prestige for them in the comity of nations.