Agriculture in the Maryut District, West of Alexandria.[1]

THE coast district lying to the west of Alexandria and known as Mareotis was well known in Græco-Roman times and for long after for its gardens and vineyards, and even down to the time of the Arab historian Makrisi figs and grapes from there were sold in Alexandria. For several centuries, however, it has been a barren waste except for small patches of barley raised by the nomad Arabs in the more-favoured spots when the winter rains are plentiful. In the report under notice an account is given of an examination made by the Geological Survey and the Ministry of Agriculture of Egypt to determine whether the area offered any prospect of a remunerative return from dry farming or from irrigation by the extension of the westernmost canal of the delta system, the Nubariya.

The district which the report covers is a belt about 15 km. wide on the shore of the Mediterranean, and it extends from Alexandria to a point about 100 km. to the westward. Starting from the sea-shore, there is, first, a series of white dunes formed of small rounded oolitic grains which, by the action of the winter rains, unite to form masses of more compact rock. Behind these dunes, which do not exceed 10 metres in height, is a narrow depression which is of considerable fertility. Farther inland is a higher limestone ridge, where numerous ruins indicate that it was once well populated. The main depression lies behind this ridge, and is about 4 km. wide; figs and barley are cultivated on the slopes on either side of the saline marsh which occupies the central portion of the depression.

The rainfall, which is limited to the months October–March, varies considerably from year to year, ranging from 100–300 mm., and if rain is scanty in November the barley, which is sown as soon as the October rains occur, may yield a very poor crop.

1 "The Soils and Water Supply of the Maryut District. West of Alexandria." By Dr. W. F. Hume and F. Hughes. (Cairo: Government Press, 1921.)

Full details are given of the physical character of the soil in many parts of the district and at various depths, but what controls all extension of vegetation is the presence of intensely saline water at or near sea-level. On account of this the cultivation of any considerable area is difficult, and the Arabs are able to utilise only the more favoured spots to raise their crops. While it seems probable that about 12,000 acres might be brought under cultivation by the extension of the Nubariya Canal, parts of this area would be too stony for satisfactory cultivation. Generally speaking, a more detailed study of this part, together with more extended contoured surveys, will be necessary before any decision can be reached as to the desirability of irrigation on this part of the desert margin.

A trial of dry farming was made in the Maryut district in the seasons of 1917–18 and 1918–19, but lack of rain in November seriously damaged the crops. The conclusion was reached that such methods are not likely to be successful owing to the variable character of the rainfall and the patchy nature of good soil.

By sinking wells and utilising the winter rainfall fruit-gardens could probably be developed, and this was the principal form of cultivation in ancient times. Over a large area numerous artificial mounds enclose rectangular areas (*karm*), which were certainly at one time gardens. These were watered from wells and from the run-off after winter rains had fallen on the enclosed land and some of the water had been conserved in the central area.

Though the investigation has not led to a prospect of a large extension of Egypt's cultivable area, it has placed our knowledge of the Maryut district on a firm basis, and has shown what developments there are possible. The report is well illustrated by maps and photographs which show the character of this coast region.

Fisheries Biology.[1]

SOME notable papers on marine biology of interest in fishery investigations are contained in the last number of the Journal of the Marine Biological Association. Mr. E. Ford takes up a matter that has hitherto received very little attention—the life-history of the dogfishes. Now that these animals are being utilised as human food (particularly the spur-dog, which enters the markets as "flake") their biology has utilitarian value, and this paper is, therefore, of much interest. The author deals mainly with phases in the reproductive cycles of the common species (the spur-dog, the rough-dog, the nurse-hound, and the sweet-william). The spur-dog and nurse-hound are viviparous, and the prolonged period of incubation *in utero* deduced by Mr. Ford will come as a surprise to most readers; this, in the case of the spur-dog, may extend to twenty-five months. Biologically, the reproductive processes in the dogfishes are of immense interest, and one may hope that Mr. Ford may continue his investigations and give us much needed information as to the natural history and physiology of these animals.

Dr. Marie Lebour continues her well-known work on the food of baby fish. Quite lately this subject has become one of extraordinary importance in fishery investigation, particularly in view of the implications of Dr. Johan Hjort's work on the cod and herring. That there are natural "crises" in the conditions that rule the abundance of sea-fishes is now established, and upon these crises—far more, perhaps, than upon any reasonable variations in the intensity of fishing—depend the quantities of marketable fish present in the sea in any year. There is a short period in the life of the ordinary fish when, its supply of food-yolk being exhausted, suitable pelagic organisms must be found and eaten. The periods of multiplication of the latter are variable, to some extent, from year to year, and so are the spawning periods of the fishes. In some years, therefore, abundant food may be forthcoming just at the time of disappearance of the larval fishes' yolk-sac, but in other years this food may fail, its production occurring well before or after the time when the larval fish transformation occurs in greatest degree. A heavy mortality in the baby fishes must be followed, two or three years later, by a scarcity of the adults, and *vice versa*.

For a proper treatment of this problem we require to know (1) the kinds of food eaten by larval and post-larval fishes, (2) the periods of maximum production of the food, and (3) the maximum spawning periods of the fishes. The first question is being investigated by Dr. Lebour with much success, and in this paper she deals with the food of baby herrings, sprats, and

1 Journal of the Marine Biological Association, vol. 12, No. 3, Plymouth, September, 1921.

pilchards. The kinds of organisms eaten depend on the phase of the fish—they are larval gastropods, diatoms and flagellates, larval molluscs and crustacea in the case of the herring; green (chlorophyllian) organisms, copepod eggs and larvæ, and copepods (sprat); copepod eggs, larvæ and adults, then mud-containing unicellular organisms, and finally molluscan larvæ in the case of the pilchard. A remarkable result is the great proportion of larval fishes which contain no apparent food, and this observation may lead to most valuable results if it can be shown that there is a correlation between the number of empty stomachs and the poverty of the sea in the necessary food-organisms. In that case we should have an easily observed measure of the coincidence between the period of abundance of larval fishes with that of sufficient food, or *vice versa,* and this is obviously the kind of datum required in order that we may be able to forecast good or bad fishery years. Obviously, the work noticed is of much importance. J. J.

The Need for Research in Colloid Chemistry.[1]

By WILLIAM CLAYTON.

COLLOID chemistry has never been discussed so frequently as it is to-day. Its comparatively recent growth and development, and the fact that its ramifications extend into every field of chemical research and industry, seem to be leading chemists to turn to colloid chemistry as a possible panacea for their numerous and varied difficulties. Certain it is that no branch of applied chemistry to-day can be declared free from colloid problems, and that the chemistry of to-morrow will be colloid chemistry, pure and applied.

Prof. Bancroft's compilation of two hundred research problems adequately serves, not only to demonstrate the wide industrial applications of colloid theory, but also to show the present position of the theoretical science itself with its too frequently purely empirical generalisations. He devotes seventy-one of his problems to a consideration of adsorption phenomena—a correct proportion, no doubt, since adsorption data can be obtained in a very definite *quantitative* way, and the results admit of immediate and varied application.

Adsorption is now recognised as playing a determining influence in heterogeneous catalysis, emulsions, fogs and smokes, surface tension, stability of solutions, coagulation and precipitation, etc. Prof. Bancroft pays particular attention to adsorbed gas films and their influence in contact catalysis. Notable progress in this field has been made by Langmuir in America, who has adduced good evidence that such adsorbed films are of monomolecular thickness. That stable films can exist at atmospheric pressure can be argued from several effects, *e.g.* catalytic poisons, passivity, over-voltage, and lubrication.

Under adsorption Prof. Bancroft details problems in flotation and wetting power, pointing out that no systematic study of the selective adsorption of liquids by solids has yet been published. Quantitative work is urgently needed in this connection, especially as the literature on the flotation of ores contains many papers lacking in sound colloid chemistry.

The caking of powders, setting of cements, behaviour of coarse and fine powders in liquids, and the reversibility of the calomel electrode are a few of the many problems involving adsorption phenomena.

One problem (No. 56) is of outstanding importance, viz. "the quantitative adsorption of dyes by alumina, stannic acid, etc., with special reference to hydrogen-ion concentration." The work of Jacques Loeb on the effect of various electrolytes on gelatin in solutions, with definite hydrion concentrations, has placed the chemistry of gelatin, casein, and other amphoteric proteins on an entirely new footing. Such proteins possess a certain pH value indicating neutrality (gelatin, $p\text{H}=4{\cdot}7$). When the pH value exceeds the neutrality figure the protein behaves as an acid, combining with cations; when the pH value is less, the basic tendencies are pronounced and combination with anions occurs. In the light of this work such familiar generalisations as the Hofmeister series of ions or the Pauli series of acids present no real existence, since the pH values were not measured. Membrane permeability, dye-staining, and certain physiological phenomena must all be referred to measured hydrion concentrations.

On the subject of emulsions Prof. Bancroft rightly points out that, whilst the problem of making emulsions has been well investigated, the converse, breaking of emulsions, has not been so thoroughly studied. Stable emulsions are only too frequently a source of great trouble in industrial operations, and work on the theoretical principles involved in devising means for their coagulation or separation is very desirable. In this connection, too, it is pointed out that, in the centrifuging of colloidal systems, no systematic study has been made connecting the quantitative relations between density, size of particles, and number of revolutions per minute necessary to cause precipitation.

Mention is made of the recent work of Holmes and Child, who failed to find evidence for the adsorption of gelatin at the oil-water interface in kerosene/water emulsions. This result contradicts the observation of Winkelblech, who proved that gelatin concentrates at the dineric interface when organic liquids are shaken with water. In any case, the effect of adsorbed films or protective layers of the emulsifying agent in emulsions still leaves much room for inquiry. The old problem of effect of oil concentration on the type of emulsion is brought up once more, Prof. Bancroft doubting the accuracy of Bhatnagar's recent work on the reversal of phases in oil and water emulsions.

A problem of direct industrial importance is referred to in connection with the saponification of fats with lime. It is tentatively put forward that water is the real hydrolysing agent, and that the lime is important because the calcium soap which is formed causes the water to emulsify in the fat, instead of the fat in the water. In this connection it is of interest to refer to Weston's recent work on the use of colloidal clay as an emulsifier-catalyst in the saponification of oils and fats.

Finally, we can only briefly mention one other important field discussed by Prof. Bancroft, viz. the formation and stability of colloids in non-aqueous liquids. The nature of the stabiliser present in such solutions, the peculiar behaviour of the alcohols with silver alcosol, the formation of jellies in organic liquids, the chemistry of the cellulose esters, the behaviour of mixed colloids in non-aqueous solvents—these are but a few of the problems requiring inves-

[1] "Research Problems in Colloid Chemistry." By Wilder D. Bancroft, Member of the Committee on the Chemistry of Colloids: National Research Council. Reprint and Circular Series of the National Research Council (U.S.A.). No. 13 (1921). 50 cents.