has decided to develop the drainage in the northern areas of the Punjab during a period of five years.

In the Punjab the progress on the study of alkaline soils is reported. These investigations have been conducted in connection with three allied problems:—(1) The prevention of land deterioration under irrigation. (2) The study of land reclamation. (3) The quality of irrigation of water.

A factor known as "Degree of Alkalisation" of the soil has been a subject of study during the year. It has been shown that crop yield in the plains of the Punjab decreases as the "Degree of Alkalisation" increases. It has further been shown that a relatively small proportion of calcium in solution can prevent alkalisation of the soil associated with the presence of the sodium salt. The equilibrium conditions for a system "sodium salt —calcium salt—calcium sodium clay" have been studied and the results are now being applied experimentally in the field. These results also have an important application in determining the quality of irrigation water that can be safely used without soil deterioration taking place. It has been shown that water containing above 60 parts per 100,000 of sodium salts in solution results in base exchange and hence the soil deterioration. The presence of a small amount of calcium salt in such a water can prevent this reaction. The quality of irrigation water is a subject of special importance in the Punjab at the present time as proposals have been made for a development of irrigation by means of tube-wells following on the electrification of the Province.

Considerable discussion took place on the silt and flow theories which have been put forward by Mr. Lacey. While some of his formulæ were accepted others that had been tested both in the Punjab and in Sind showed that they did not, in their present form, apply to the channels in these Provinces. It was agreed that the formulæ were useful in connection with the remodelling of channels. Extensive studies have been made in the Punjab and in Sind to determine the relation that exists between the bed silt in the channel and hydraulic data of the channel. Two types of siltometers have been developed at the Irrigation Research Institute at Lahore and they are proving of great value in studying the characteristics of silt. The work done at Lahore has shown that the Distribution Curves for the bed silt in a silted, a scouring, and a stable channel have typical forms. A number which can describe a silt and which is a function of the weighted mean diameter of the silt particles is now being studied in connection with the hydraulic data of channels with the object of determining whether any relation between the silt and the hydraulic data exists. Results of these investigations will probably have an important influence on the design of channels and on cost of maintenance of channels already in existence.

At the conclusion of the discussion of the Agenda the Research Officer of Madras drew attention to the growth of weeds in channels in his Province, a subject which also appeared to be of considerable importance in Bengal. A solution of the problem would be of considerable economic value and the subject deserves intensive study.

The Chemistry of Milk.

ONE of the important discussions organised by the Chemistry (B) and Agriculture (M) Sections of the British Association for the Advancement of Science at their last session was on "The Chemistry of Milk".

Dr. Tocher contributed a paper on the *Composition of Milk and the Present Regulations*. The proportions of the constituents of milk are known to vary widely from sample to sample even in the case of bulked milk. In the case of fat and solids not-fat percentages, it is known that many cases occurred where the values fell below the prescribed presumptive limits under the regulations. Several instances are known where *genuine* milk has been held to be watered. Various workers have found that the freezing point of milk is the least variable of all physical characters, the coefficient of variation being approximately 1·5 as against 4·5 for refractive index and 5·0 for specific gravity. On account of its low variability the freezing point of milk has been frequently used as a criterion for "watering".

In the course of his paper on the *Chemical Composition of Abnormal Milk*, Dr. Dabies said: "Abnormality in buffer value in the acid range, in the balance of acidic and basic constituents, in the distribution of ionic acid and non-ionic metallic radicles (Ca), in the amounts of the various forms of casein present and in the amount of heat-coagulable protein, is reflected by abnormality in rennet action, 'curd tension' and in heat stability at temperatures above 100°C.

Dr. Linderstrom-Lang contributed an interesting paper on *Some Chemical and Physical Properties of Casein*. "Casein (caseinogen), the phosphor protein in milk, is a mixture of two or more substances. By treatment with acid alcohol it may be divided into several fractions that duffer in chemical composition, especially in their content of phosphorus. Mixing the fractions in their original proportions gives the original casein with its characteristic physical and chemical properties.

Investigations of the solubility of casein in acids and bases show its complex nature. The solubility is, under constant conditions, a function of the amount of casein present as precipitate, and the dissolved substances differ in chemical compositions from the precipitate.

The fact that casein is a mixture makes investigations of its chemical structure difficult. Due to its high content of phosphorus and the importance of this to nutrition problems, the mode of combination of this element has been the subject for elaborate studies. Experiments show that the phosphorus in casein is present as phosphoric acid and—at least partly—bound to serine by an ester linkage. As the phosphorus content of the different fractions of casein is different, this problem is of importance to the explanation of the above-named physical properities.

Other papers that came up for discussion were *The Composition of Milk Fat* by Prof. T. P. Hilditch and *The Vitamins of Milk* by Dr. S. K. Kon.