methods. The application of Karl Fischer reagent in the estimation of moisture in a large number of organic compounds has been described in great detail. In addition to the moisture determination, the use of the reagent to estimate organic functional groups like hydroxyl, amino, carbonyl, nitrile etc., is dealt with exhaustively. The literature on the subject is collected upto the early months of 1947 and is quite comprehensive.

In their enthusiasm to stress the importance of the reagent the authors have not been quite critical on the efficiency of the reagent when applied to certain systems. The determination of water in silica gel can be quoted as an instance. The moisture content of the gel by the Fischer reagent is 5·48% as against a value of 4·7% determined by drying the sample at 150° C. for 4 hours. It is well known that silica gel retains 4-5% water even after prolonged drying at 150° C. Hence it has to be concluded that the present method gives low values for moisture in silica gel. Similar low values are also obtained in the case of calcium sulphate. It is thus obvious that the Karl Fischer reagent cannot be employed in the case of insoluble porous solids like silica gel or alumina where the solid surface has a great avidity for water. In fact anhydrous alumina can be employed to remove the last traces of water from alcohols!

The term "Aquametry" has been coined by the authors to represent 'the analytical process of water measurement ..... of materials'. The reader would then except a detailed and critical account of the several methods that are at the disposal of the chemist for the analysis of water. But it is sad to find that the authors have devoted only 16 pages for the review of various methods in "Aquametry". Methods where physical properties like density, refractive index and viscosity are taken advantage of in the aquametry, find only a passing mention in this dook. The reader would have deen greatly benefitted if the authors had devoted about 100 pages where a critical account of the existing methods for aquametry had been given in addition to the present information about Karl Fischer reagent. The present volume can more appropriately be called by its secondary title: "Application of the Karl Fischer Reagent to quantitative Analysis involving water."

In conclusion the authors have to be congratulated for placing such a detailed and authoritative account of the Karl Fischer reagent at the hands of the analytical chemists.

M. R. A.

PEST INFESTATION RESEARCH*

THE first report of the work of the Pest Infestation Laboratory of the Department of Scientific and Industrial Research, England, has been published by the H.M.S.O. on June 7, 1949.

The laboratory was organised in response to a request from Industry for research on pest control, as related to pre-War conditions; but since the laboratory was actually constituted only after the outbreak of War, war-time problems of importance in pest control were given high priority. The most urgent of the problems, was the bulk storage of grain for long periods and in environments which proved propitious for insect development. While the Ministry of Food's Infestation Control Division did the work of inspection of stored food and the application of appropriate control methods, the Pest Infestation Laboratory's task was to undertake research to enable the Control Division to operate efficiently. This meant getting to know all about the insects in relation to their food-stuff and the conditions under which it was stored. The work, therefore, involved biological studies of the insects and the mites and physical studies of the environment of the grain in bulk and in storage.

Three main lines of work that engaged the attention of the Pest Infestation Laboratory were— (1) Estimation of Infestation; (2) Development of control measures; and (3) Research on sprays. The estimation of the infestation of a given sample of grain was made possible by the improvisation of the "Carbon dioxide method", through which the "Carbon dioxide figure" for that sample could be worked out. Both the grain and insects infesting it produce together measurable quantities of carbon dioxide. Broadly the concentration of carbon dioxide found in the mass of grain stored is proportional to the number of insects present inside the grain. A related finding in this connection was that insects could and did cause grain to "heat" through the formation of "hot spots". Of the control methods developed, the fumigation of silo bins was the most important and is being used now on a very large scale. Re-

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lating closely to fumigation of grain, were problems like the penetration of the gas into the food-stuff, its physical adsorption or chemical reaction and the nature and permanence of residual effects, in addition to the toxicity of the gas to the many insect species concerned. Sprays for the disinfestation of warehouses in which insect-free food-stuffs had to be stored, were developed. In order to ensure a reasonably long toxic life of the insecticide film deposited on walls, boxes, etc., a method was developed for pretreating the surfaces to be sprayed, which gave a greatly increased duration of toxicity.

The Pest Infestation Laboratory also undertook work on fly-sparys on behalf of the fighting services and was among the first to report on the striking toxicity of DDT to house-flies. A new spray-gun was also developed designed to withstand the toughest treatment and at the same time to provide an accuracy of performance not hitherto achieved.

In this context, the present conditions obtaining in India are of special interest. A somewhat parallel organisation to the Ministry of Food's Infestation Control Division in England, was set up in India practically after the cessation of the Second Great War, under the title—"Directorate Storage", whose duty was was laid down to be the dissemination of knowledge in respect of useful methods of large-scale storage of locally-procured and imported grains of different kinds and the training of personnel for organising proper storage and promoting "go-down hygiene" and issuing of useful propaganda leaflets prescribing certain definite regulation to be followed. But no research laboratory of the kind of the Pest Infestation Laboratory in England, was set up, to undertake research to enable the control personnel to operate efficiently. Problems like the fumigation of silo bins in England, are numerous in India and have long been waiting to be tackled with special reference to the peculiar and varying Indian conditions of storage of grains. Estimation of infestation of grain under Indian methods of storage and in a variety of receptacles used for storage, is vastly different from that applying to the silo bins. Equally different are the problems like the penetration of the gas, its sorption and the nature and permanence of residues, etc., in India. A host of other allied matters have been in need of investigation. A special well equipped central laboratory with competent staff alone could undertake research on these important and urgent problems.

The Indian Agricultural Research Institute at Delhi and the Agricultural laboratories in the several Provinces and States have never been properly and adequately staffed and financed for the purpose of conducting research on the varied problems; and the results already obtained by workers in these laboratories and by workers of special schemes financed by the Indian Council of Agricultural Research have not covered a wide enough field. One of the chief reasons for this state of affairs is the inherent defect in the organisation and working and lack of co-ordination. These could perhaps be remedied by organising a central Pest Infestation Research Laboratory, generously equipped and adequately staffed, and Bangalore would appear to offer an ideal place for locating the laboratory not only because of the substantial amount of pioneering work which has been carried out by the Entomological section of the Department of Agriculture but also on account of an active school of research on Insect Nutrition and Insect Physiology which has developed in the Division of Fermentation Technology at the Indian Institute of Science.

BEE COMPASS

Sunlight and the polarized light of the sky appear to enable a scout bee which has discovered a source of nectar to orient herself when executing a bee dance to tell other bees about her find. Distance is indicated by the dance pattern, direction by the way the bee's body is pointed most of the time, according to the Austrian entomologist, Professor Karl von Frisch. *Science Service* reports his announcement of this discovery at a recent meeting of scientists in Washington D. C.

In total darkness or red light (which bees cannot perceive) the finder-bee became confused in her dance, but oriented herself toward the nectar find when a flashlight was held in the approximate position of the sun. When the flash-light "sun" was held in a false position, the bee gave an incorrect direction. The bee was also properly oriented when she could see a small patch of blue sky (polarized light) but became confused in the unpolarized light of a white cloud drifting across the opening. (By courtesy to *Sky and Telescope*, 1949, VIII, P. 253.)