tests. No distinction between the various type of disinfectant is necessary. Hypochlorites were officially approved for use on dairy farms in 1949. The first quaternary ammonium compound was approved in 1957; its performance was compared with sodium hypochlorite plus alkaline detergent in field trials and in the Hoy can test. All the results were close to those obtained with the control hypochlorite, and no significant difference was detected. These tests also showed that there was a close relationship between field trials and the Hoy can test, which is now largely relied upon at the National Institute for Research in Dairying.

There is some difference between the usual farm cleaning and disinfecting methods in Great Britain and the United States. The two operations are usually done together in the former, but in the latter they are generally separate operations. Many different laboratory test methods have been suggested in recent years to evaluate germicidal preparations for dairy use. Most of the tests were devised for quaternary ammonium compounds, and measure the effect of the test material either on suspensions of bacteria or on soiled surfaces, which may or may not be inoculated with pure cultures of bacteria. Of the tests devised in the United States five were listed by Miss Cousins, three being suggested for disinfectants and two for sanitizers. One of the latter tests, Chambers' modification of the Webber and Black method, indicates that the use of 50 p.p.m. hypochlorite is satisfactory, and good correlation with practice is claimed.

The tests suggested in Britain include the Hoy can test, which will be discussed more fully below, two methods using steel strips, one using rubber liners, and one using stainless steel pipes. In general, it is found that bacterial cells on surfaces are less easily killed than those in suspension, and differences occur between the performance of different groups of compounds in the two types of tests. Quaternary ammonium compounds, for example, do not give good results in suspension tests, but on the surface film (as in the Hoy can test) the results

are quite different. The question applicable to all methods is, Can they replace large-scale tests? The Hoy can test has been scaled down from the original ten gallon to five gallon cans. Test substances are compared with similar dilutions (use and 2/3 use) of hypochlorite. The cans are randomized, and the results are treated statistically. The cans are soiled with milk, drained and dried in a thermostatically controlled room. They are treated with test material for a determined time, quenched, rinsed with Ringers solution and squeezed to remove surviving organisms, which are counted. If the methylene blue reduction time of the milk used for the test is greater than 30 min. or if the temperature is less than 72° F., the counts will be too low. It is desirable that the hypochlorite should not produce sterile cans, hence the use of the 2/3 dilution. Low counts can also be due to too rapid drying of the films, so the humidity of the air and its rate of movement is also important: the amount of milk which is left on the sides of the cans is small, probably about 3 ml.

A suspension test is also used at the National Institute for Research in Dairying for screening new substances, but it has only a limited value, as it does not correlate as well as the Hoy test with practical trials. Iodophors are not good on the can test, but satisfactory on the suspension test; 50 p.p.m. iodine in an iodophor is approximately equivalent to 300 p.p.m. of chlorine, but there is some suspicion that the iodophors cause staining. With quaternary ammonium compounds, 200–300 p.p.m. is satisfactory. The relative effects of quaternary ammonium compounds and detergents are not yet established.

For testing preparations for use on milk processing plant, the Hoy test can be used, but the increasing use of new cleansing methods raises new problems. The long-term effect of using detergent sterilizers is not yet known. Is there a build up of contamination in crevices, etc., on the plant? Work is going on to find an answer to this problem. Evaluation of antibacterial compounds cannot be separated from work on detergency; the final evaluation must be their performance in practice.

EAST AFRICAN AGRICULTURE AND FORESTRY

THE East African Agriculture and Forestry Research Organization is an inter-territorial research organization administered by and forming part of the East Africa High Commission. Research workers in other parts of the world will be interested in the annual report for 1958 recently published*.

Four main investigations are in progress on the water use of trees and crops and the effects of land use on stream flow and local climate. Details are given of the areas investigated and the changes which occur when natural regeneration is replaced by plantations. An integral part of these experiments has been a study of the estimation of total rainfall over restricted areas with fairly close distribution of rain gauges. This involved the use of tree-top platforms for measuring rainfall at the level of the forest canopy, and some exploratory measurements

were undertaken to find the optimum size of forest clearings in which to expose a rain gauge a little above ground-level.

Application to a wide range of East African conditions of Penman's method of estimation of evaporation from other meteorological data has led to the construction of new tables for rapid computation of the evaporation estimate. In catchment area research and soil erosion studies it is important to be able to describe the storm characteristics of the rainfall. The quantity, time of day, duration and intensity may be estimated from autographic rain gauges. The detailed analysis of such data indicates considerable differences in pattern of rainfall in different catchment areas.

Work on estimation of irrigation requirements of *arabica* coffee have been continued and comparisons made between different types of evaporation tanks. Traditionally, shade trees are said to be beneficial to tea plantations, and experiments are in progress to elucidate the complex of factors concerned. The

* East Africa High Commission; East African Agriculture and Forestry Research Organization. Record of Research for the period January 1 to December 31, 1958. Pp. vii+109. (Nairobi: Government Printer, 1959.) Sh. 3/50.

greater ability of sorghum stomata to recover from severe drought, as compared with those of maize, was confirmed in the field. Thus, some of the well-known resistance to drought by this crop is probably due to the ability of its stomata to recover from severe water shortage. Studies of the behaviour of stomata during and after recovery from drought is being extended to other crop plants. The effect of soil drying on humus decomposition and mineralization of soil nitrogen has been further studied, and it has been found that addition of activated charcoal to a dry soil completely inhibited the flush of decomposition that normally occurs when a dry soil is moistened. This supports the hypothesis that drying a soil increases the amount of decomposable organic material going into solution, and further experiments have lent support to the idea.

Ecological work during the year was largely concerned with the determination of climatic types of vegetation in south Kenya. An account is given of twenty-one years work on *Cassava* breeding for

resistance to mosaic and brown streak viruses. Projects on maize breeding include a study of resistance in maize to the virus of streak disease and maintenance of rust races and the pure lines of maize resistant to one or other of the known rust races so that, in the event of new races appearing in the field, genetic studies may be resumed. A *Sorghum* breeding research scheme has been inaugurated. The nematologist has completed a survey of plant parasitic nematodes of East Africa. Species of root-knot nematodes have been found in indigenous forest throughout East Africa and may constitute a problem for future development of crops in such areas. The Animal Husbandry Division is making a study of the nutritive properties of maize with the object of finding why maize is an unsatisfactory pig food and whether it would be economic to correct its detrimental properties. Results to date suggest that supplementary nicotinic acid would permit the effective use of high-maize rations.

E. C. HUMPHRIES

EXCAVATIONS AT LA VENTA, MEXICO

A RECENT publication by the Bureau of American Ethnology of the Smithsonian Institution entitled "Excavations at La Venta, Tabasco, 1955", represents an important contribution to Mexican archaeology*. It should be studied in conjunction with previous Smithsonian reports which are quoted in the bibliography, particularly "La Venta, Tabasco. A Study of Olmec Ceramics and Art" (Bulletin 153 of the Bureau), also by Dr. P. Drucker.

The La Venta or Olmec Culture remains elusive both in its distribution and in its temporal range, but now we know a great deal more than we did about the type site, and for the first time we have a series of radiocarbon dates which give an idea when that particular site was occupied. The Olmec Culture has given rise to a notable art style, examples of which are found over a far wider area than the rather limited parts of the tropical forests of the Gulf Coast of southern Vera Cruz and Tabasco, where its chief monuments have been found. Broadly speaking, this art style is characterized by stone carvings and pottery figurines representing beings with puffy, loose-lipped 'baby faces', some of which take the form of colossal stone heads, and by highly stylized jaguar faces obviously related to the human ones. These are sufficiently prominent to provide strong evidence of jaguar worship, even without some remarkable features of La Venta which are mentioned below. One of the most important outliers of the style, where it chiefly takes the form of pottery figurines, is at Tlatilco on the outskirts of Mexico City, and this in its turn has relationships of another kind with sites of comparable age in Guatemala, Ecuador and Peru. In Peru, but not so far in the intervening area, evidence of a strong jaguar cult has been found, and it is tempting to relate it with the Olmec one, although its artistic representations are very different. This is enough to show the importance of the Olmec

Culture, and how welcome is further information about it.

La Venta is a ceremonial site with few signs of ordinary dwellings. It occupies a ridge on an island surrounded by swamps, and was accurately planned about an axis running approximately north and south. The portion of it which has been investigated lies north of a large pyramid and consisted of a number of platform mounds disposed about two courts, of which the northern seems to have been the most important. Apart from a limited use of stone facing blocks, and some palisades made of rows of basaltic columns, the actual construction was carried out entirely in clays and sands of various colours, some of which at least must have been carried considerable distances.

In conformity with the usual pattern of Mexican ceremonial sites, at least four major reconstructions have been distinguished in each part of the site which has been investigated, and a most remarkable feature in connexion with each of these stages was the digging of enormous deep pits through the older structures, in which were placed what are interpreted as massive offerings consisting of pavements of slabs of varieties of metamorphic rock, loosely described as serpentine. The largest of these was 28 courses thick, and contained something of the order of 1,000 tons of rock. In at least two cases these underlay an even more remarkable mosaic jaguar mask measuring about 15 by 20 ft. of serpentine slabs set in clays and sands of various colours, and it is probable that more remain to be discovered. The facts that these were deliberately buried before a single rainy season had passed, and that none of the rocks of which they were made occurs within less than 60 km. from the site, and some perhaps more than 100 km., add to a most amazing phenomenon. Other features of the site were smaller offerings, not it seems connected with burials, some of which are related in position to the axis of the site; they include many groups of jadeite celts, and a most curious group of typical baby-faced sexless Olmec stone figurines which appear to be arranged to represent some ceremony.

* Smithsonian Institution: Bureau of American Ethnology. Bulletin No. 170: Excavations at La Venta, Tabasco, 1955. By Philip Drucker, Robert F. Heizer and Robert J. Squier. With Appendixes by Jonas E. Gullberg, G. H. Curtis and A. S. Leopold. Pp. vii + 312 + 63 plates. (Washington, D.C.: Government Printing Office, 1959.)