

fan, has been arranged to pick up vent-pipes and gas-flues from all digestors, as well as the exit pipes of the counterpoised draught-hoods which are pulled down over the evaporating pans when evaporations are in progress.

The surroundings of the laboratory are shown in some of the photographs. In Fig. 2 appears the adjoining research laboratory, whilst Fig. 4 shows a corner of the fitting-shop and engineering store. This invaluable adjunct contains a stock of pipes, fittings, and tools, some small power-driven machines, including a screw-cutting lathe, and working places for

carpentering, fitting, and soldering. The chemical store, which is arranged to contain casks, drums, and carboys, as well as Winchesters, does not appear in the photographs.

With regard to the question of slinging and heavy work generally, the numerous overhead principals provide so many points from which a lifting block may be hung that it was not considered necessary to install a travelling crane. Two rubber-tyred bogeys, one of which has been specially designed, suffice for the carriage of all the heavier objects which we are likely to have to handle

J. F. T.

## Great British Droughts.

By CHAS. HARDING.

IT is fortunately seldom that such persistent dry weather has to be chronicled as that which has now continued for several months. A more complete history of the drought will doubtless be written when all possible facts have been collected.

At Greenwich Observatory the records show that the rainfall has been less than the normal for nine consecutive months, from October, 1920, to June, 1921. The total measurement for the whole period is 9.78 in., which is 7.74 in. below the average for the 100 years ending 1915, and only 56 per cent. of the normal. This is the driest period from October to June in the last 105 years; the next driest corresponding period occurred in 1879-80, when the measurement was 10.50 in. There is only one longer period at Greenwich—November, 1846, to January, 1848, a period of fifteen consecutive months—with the rainfall below the normal. The controlling factors of the weather have commonly been a low barometer in the north of the British Isles, and a relatively higher barometer with anticyclonic conditions in the South of England.

In addition to the Greenwich observations, those at Eastbourne have been chosen to represent the more southern portion of the kingdom. The drought at Eastbourne is scarcely so severe, since the rainfall for each of the months December, 1920, and January, 1921, was in excess of the average for the period of thirty-five years ending 1915, chosen as the normal by the Meteorological Office. The total rainfall for the nine months from October, 1920, to June, 1921, inclusive, is 15.62 in., which is 7.95 in. in defect, and 66 per cent. of the average fall. This is 10 per cent. of the average more than at Greenwich.

Attempts have been made from time to time to detect a weather cycle, but so far these have not been very successful. The favourite cycle with meteorologists is that corresponding with the periodicity of solar activity; but, so far as the general weather is concerned, it does not yield satisfactory results. Prof. Brückner, of Berne, has discussed the subject of periodic variations and changes of climate in detail, and his discussion is conducted on lines which perhaps might well be followed by others. For the fluctuations of

rainfall he has made use of observations at 321 points on the earth's surface, and of these no fewer than 198 are in Europe. Prof. Brückner deals with averages for five years, and the period found for the cycle is thirty to thirty-five years. Continuing the cycle to the present time, a period of deficiency of rainfall is shown for the years 1921-25; the previous period of deficiency was 1891-95. The next period of excess should occur in 1936-40. The present deficiency of rain seems decidedly a fulfilment of Prof. Brückner's cycle.

An absolute drought is reckoned as more than fourteen consecutive days wholly without rain, and a partial drought is a period of more than twenty-eight consecutive days the aggregate rainfall of which does not exceed 0.01 in. per diem. No absolute drought has occurred at Greenwich this year, and the only partial drought was from February 1 to March 5, a period of thirty-three days during which the total rainfall was 0.24 in. The spring drought of 1893 is probably the most severe of recent years; the absolute drought continued for forty-four days, whilst the partial drought at Dungeness lasted for 127 days, and at North Ockenden, Romford, Essex, for 128 days. The abnormal summer of 1911 experienced three absolute droughts at Greenwich—April 11 to 24, fourteen days; July 1 to 23, twenty-three days; and August 2 to 18, seventeen days. There was an exceptionally long partial drought continuing for fifty days, from June 30 to August 18; the aggregate measurement of rain during the period was 0.33 in. As many as three absolute droughts occurred in London in the years 1868 and 1887, and four in the year 1858. In 1880 there was an absolute drought for twenty-eight days—from August 9 to September 5. In the year 1716 it is recorded that, in consequence of a long drought and a south-west wind, the River Thames became so low that thousands of persons passed across on foot under the arches of London Bridge.

There is a great diversity in the periodicity of rainfall, and two consecutive summers often differ widely from each other, as shown by the rains in 1920 and 1921. In 1903, a remarkably wet year, the aggregate measurement of rain at

Greenwich for the six months April to September was 22.21 in., whilst for the following summer, 1904, it was 8.69 in. "British Rainfall," dealing with observations from 1726 to 1891, shows that during the first forty years the rainfall in only nine years reached the average, and from 1738 to 1762, a period of twenty-five years, there is only one year above the average; this is a more persistent drought than has occurred in the nineteenth or twentieth century. There was a succession of wet years ending with 1882, and this was followed by a very dry period. In the twenty years 1883 to 1902 the Greenwich observations show an aggregate deficiency of rain amounting to more than 40 in. During this period there were sixteen years with a deficiency, one year

with the average fall, and three years with an excess. Each year from 1895 to 1902 had a deficient rainfall, the total deficiency in the eight years amounting to 25.5 in.

The question of interest is now: When will the exceptional heat and drought of the present year cease? The absence of rain is continuing well into July, and each week the drought is becoming more serious over the whole country. The increased interest in meteorology, brought about by the late war, has added much to the staff and efficiency of the Meteorological Office. Every effort is being made to improve our knowledge of the weather changes, and probably in a few years it will become possible to predict the chief characteristic features of a season.

### The Scarcity of Swallows.

By DR. WALTER E. COLLINGE.

FOR some years past certain ornithologists have directed attention to the decreasing number of swallows seen in the British Isles during the months from April to September. This diminution was particularly marked in 1918 and 1919, less so in 1920, but is still more apparent in the present year. For a time the scarcity was denied by many, or stated to be only of local occurrence, but the condition of affairs during the present season is sufficiently well marked to convince the most sceptical.

The swallow economically is one of our most valuable birds, its food consisting practically entirely of insects, and any scarcity of these birds removes a most important factor in the destruction of injurious insects. The causes which have led to this scarcity are not at present all known, but there are some which have been operating for a considerable time past, and their effects are now making themselves felt.

First, there is the deplorable mortality of migrants which takes place around our coasts in connection with the lighthouses and lightships, and, as has previously been pointed out, a considerable percentage of these birds might be saved. Something towards minimising this danger has already been done, but the swallow is

a day-migrant, and so largely, if not entirely, escapes this danger.

The enormous increase of the house-sparrow during recent years has undoubtedly had much to do with the decrease of the swallow. Not only do the sparrows take up their abode in the swallows' nests, but they molest and persecute the birds during the whole period of incubation. In the United States there has of recent years been a very serious decrease in the number of house-martins due to this cause.

There are, however, other causes for the present scarcity which do not arise in this country. In 1918 and 1919 the continuous waves of June migrants were unobserved or of very short duration, and during the present season they have been still fewer, all of which clearly indicates a diminishing immigration. Moreover, in 1919 and 1920 the majority of the swallows commenced their southern migration early in August.

In view of the importance of the swallow economically, the question is one calling for immediate attention and investigation, and until we know more about the matter it might be well to place this bird and its eggs under stricter protection.

### The King George V. Dock, London.

A FUNCTION of special interest and importance in the history of the Port of London was performed on Friday last, when the King visited North Woolwich for the purpose of opening and naming the new dock of the Port of London Authority which has been under construction since 1912.

The addition to the enclosed water area of the port amounts to 64 acres, and as the depth of the dock is 38 ft., the new accommodation will prove extremely useful for large ocean-going vessels of the present day. The dock is entered by a lock

800 ft. long and 100 ft. wide, having a depth of 45 ft. over its sill at high water, and 20 ft. less at low water. The capacity of the chamber can be increased to a maximum length of 910 ft. by placing a *caisson* in a special recess instead of using the innermost pair of gates. The dock averages 600 ft. in width, but tapers from east to west. On the north side there is a concrete quay wall of the ordinary type. On the south side a somewhat novel arrangement has been adopted. Projecting into the dock, and parallel with the quay line at a distance of 54 ft. there-