almost without a ripple. A fishery for these whales began in 1810, and in 1887 a single ship captured about fifty in a year. The fishery continues still, the whole carcass being utilised, the flesh for feeding cattle, and part of it and the bones forming manure.

Rudolphi's rorqual, again, is rare, and its oil contains less stearine than in other whales. The baleen, however, is the finest of the series, and many of the blades are pure white. Sibbald's rorqual is likewise rare, and goes under the name of the "sulphur-bottom whale," though there is no ground for such a term from its actual coloration. Its fingers are indicated externally in the flipper, even in the fœtus, and the skull has a broader rostrum, agreeing in this respect with the small finner. Little is known of the age of such huge whales, yet the occurrence in the Antarctic seas of giant forms, approaching 90 ft. in length, of a species apparently identical with this would appear to support the view of long life. The small finner or little piked whale is not uncommon, but the author, in mentioning the plicæ of the throat, does not allude to their forking. He found this whale occasionally "breaching"—that is, leaping clear of the water—and that no "spout" was visible, thus in both features differing from the British representatives. Its food on the shores of the United States is chiefly capelin and herrings. Scammon described another closely allied species, viz. *Balaenoptera Davidsoni*, which the author rightly ignores. It refers only to the foregoing. In his account of the last species, the humpback whale, he gives a careful description of the coloration of the flippers (called "fins" throughout the memoir), the upper surface being chiefly white, but that the extent may vary with age, that of the Scotch example harpooned in the Tay in 1884, and described by Struthers, being entirely white. These huge organs (about 12 ft. long and 9 in. thick in a 40-ft. whale) are supposed by the author to be used for swimming, but in the example from the Tay they were used for sounding, especially when efforts were made to drive it on the beach. This form has a rudimentary femur. The vigour and tenacity of this whale and its frequent leaps during its gambols are remarkable. On the whole, the external characters, and even the internal and external parasites of these American Cetaceans, conform to the conditions found in our own waters, a result to be anticipated in forms possessing a range so extensive.

The memoir is illustrated by sixteen excellent lithographic plates and several text-figures, efforts being made even to show the fimbriæ on the edge of the powerful flukes of the humpback whale, but the small outline in this and other cases falls much short of the condition in Nature. Various tables of measurements and records of captures are also interpolated in the text. The Boston Society of Natural History and the painstaking author are to be congratulated on this monograph, which places in the hands of the public a succinct yet comprehensive account of each form occurring in the waters of New England.

W. C. M.

## COMMERCIAL AERONAUTICS.

THE lecture delivered on May 30 at the Central Hall, Westminster, by Mr. Holt Thomas, on "Commercial Aviation," should awaken a considerable amount of interest in the commercial possibilities of aircraft after the war. The lecture was in effect a prelude to the meeting of the Civil Aerial Transport Committee, of which Lord Northcliffe is chairman, which has recently been mentioned in these columns. The serious consideration of commercial aeronautics will involve a great deal of scientific work, since the machines which will be necessary for commercial transport will differ in many ways from the types which have been developed to meet the demands of war. Speed will still be an important factor, though not of such paramount importance as in the military aeroplane. Mr. Holt Thomas pointed out that an aerial mail to Paris could be worked profitably at a charge of one halfpenny per ounce, the time of transit being about three hours, and this one instance is sufficient to show the great advantages which aerial transport could confer upon modern commerce. The influence of winds would necessarily render such a mail service more erratic than those now in operation, but the greatly increased speed would more than compensate for this, especially in the case of journeys which now involve both land and sea transport. The question of passenger conveyance is much more complicated than the establishment of aerial mails, as it will be necessary to design machines to give a reasonable amount of comfort to the passengers, especially on the longer journeys. Such difficulties of design are by no means insuperable, and it is practically certain that passenger services will be established in the near future, especially to places not easily served by railway. As Mr. Holt Thomas remarked, the aeroplane could be used to develop outlying places until they grew sufficiently large to warrant the construction of a railway line. The aerial mail will probably come first, owing to the obvious benefits such a rapid service would bring, and to the fact that it would not involve any radical changes in the design of the necessary machines.

Mr. Louis Coatalen, the well-known designer of the Sunbeam Company, delivered an interesting lecture on "Aircraft and Motor-car Engine Design" on May 16 before the Aeronautical Society. He commenced by pointing out the wide differences between the aeroplane engine and the type of engine previously developed for motor-cars. The chief desiderata in the aeroplane engine are lightness and the ability to work continuously at maximum power, and these considerations scarcely affect the design of the car engine at all. The engines designed for racing cars are much more nearly analogous to the aircraft type, and the lecturer remarked that the experience gained on such racing engines was of great value in the early days of aeronautics. The extent to which design had progressed was illustrated by the fact that in two years the weight of aeroplane engines had been reduced from 4·3 to 2·6 lb. per horse-power, and that without sacrificing trustworthiness. The question of valve design received a good deal of attention, the lecturer stating that in his opinion the best arrangement was to use two inlet and two exhaust valves, and to place the sparking-plug in the centre of the cylinder head. Coming from such an experienced and successful designer as Mr. Coatalen, the paper is full of valuable information, and should be read by all who are interested in light petrol motors, whether for aviation or for other purposes.

## THE PAST WINTER.

WITH the publication of the Monthly Weather Report of the Meteorological Office for April observations are now complete for the five months December, 1916, to April, 1917, which embrace the abnormally cold and wintry period experienced generally over the British Islands. Temperature results are given in great detail in the reports and the data afford a most thorough examination of the exceptional character of the weather.

Cold conditions set in towards the close of November and continued until nearly the close of April. The report for December shows a deficiency of temperature everywhere in the British Islands, except at

most places in the north of Scotland, where the average excess was about 0·5° F. At Bath the deficiency amounted to 5° January had a deficiency over the whole of the United Kingdom, the defect being greatest in the midland, southern, and western parts of England and in Ireland, exceeding 5° in a few places. February had a slight excess of temperature in the Shetlands, Orkneys, and Hebrides; elsewhere it was deficient, the deficiency exceeding 7° at Hereford, and being more than 5° at many places in different parts of England and at a few places in the south of Ireland. March had a deficiency of temperature over the entire area of the British Islands, exceeding 5° at some places in the midland and eastern districts of England. April was everywhere cold, the deficiency of temperature exceeding 5° in many parts, and amounting to 6·6° at Aspatria, in Cumberland.

London is represented by eight stations, including Greenwich and Kew Observatories. The mean temperature, the arithmetical mean of the maximum and minimum readings, from the eight stations for the five months December, 1916, to April, 1917, is 38·0°, which is 3·6° below the average for the whole period. The highest of the several means for London was 39·3° at South Kensington, the observing station of the Meteorological Office, and the lowest Hampstead, 35·9°. The mean of the minimum, or night, readings at Hampstead was below the freezing point in each of the months from December to March, and in April the mean minimum was 33°. At Greenwich the mean of the maximum for the five months was 43·3°, the mean of the minimum 32·3°, and the mean was 37·8°, which is 3·8° below the normal. The means for January and February were both 35·3°, and April, with a mean of 42·7°, had a deficiency of 4·5°, the greatest deficiency from the normal in any of the five months. The mean temperature for the five months was 0·2° higher than for the corresponding period from December, 1890, to April, 1891, and it was 0·1° lower than for December, 1878, to April, 1879, the next lowest mean since 1841, and 0·2° lower than from December, 1844, to April, 1845.

Taking six representative stations in the midlands, for the five months the mean temperature was 36·8°, and the difference from the normal was *minus* 3·9°. At Brighton the mean temperature was 38·6°, a deficiency of 3·9° from the average. In Dublin the mean temperature for the five months was 40·0°, and the deficiency 3·5°; at Jersey 40·7°, and deficiency 4·2°. Three representative stations for Scotland give the mean temperature 37·9°, and the mean deficiency from the average was 2·3°.

Meteorological information from western and northern Europe shows that other parts were similarly affected with prolonged cold.

Dr. Mill, of the British Rainfall Organisation, in a letter to the *Times* of June 4, directs attention to the month which has just closed as being the warmest May at Camden Square, London, since the establishment of observations in 1858. He gives the mean temperature on a Glaisher stand as 59·1° F., or 5·1° above the average, whilst April was just 5° below its average At Camden Square May, 1868, had a mean temperature 58·9°, a trifle cooler than the recent May, and it was followed by a very hot summer. Dr. Mill quotes several warmer Mays according to the old London records, and mentions that only in 1809 did an extremely warm May follow, as this year, an extremely cold April. At South Kensington, the observing station of the Meteorological Office, the mean temperature in a Stevenson's screen for May was 59·6°. The Greenwich observations give 58·8° in 1841 and 1848 as the previous highest May temperatures, from maximum and minimum readings, since 1841, and in 1893 the mean was 58·4°. In 1908 at Greenwich the mean temperature for April was 44·3°, which is 4° below the average, whilst that for May was 56·7°, or 3° above the average. The following summer was by no means fine or hot. CHAS. HARDING.

## THE COOLIDGE X-RAY TUBE.

THE Coolidge X-ray tube has been on its trial in this country during the last two years, and it may be said with some confidence that it has gone a very long way towards justifying the claims which have been made concerning it. Whether the tube be judged from the laboratory or from the clinical point of view, it marks a new era in the history of the X-ray tube. There is now to the hand of the experimenter or of the radiologist a source which provides him with a beam of X-rays which can be varied in the course of a few seconds, as regards both quality and output, over a very wide range; such radiation, moreover, may be repeated with certainty.

The work of Sir E. Rutherford and his colleagues, which was directed to find the shortest wave-length of the radiation emitted by the Coolidge tube, disclosed the fact that a limit was set to the penetrating power of this radiation when the potential difference between the terminals of the tube was about 150,000 volts. The Coolidge tube can be run at a higher working voltage than the ordinary X-ray tube owing to the absence of any measurable quantity of gas within the former, and the range of radiation emitted by it extends rather further into the region of the shorter wave-lengths than is obtained with the older type of tube.

There is a considerable clinical use of such very penetrating rays, which are rather more penetrating than the $\gamma$ rays from radium-B, but less so than those emitted by radium-C. The difficulty of protecting those who apply such radiation is considerable, but the necessity for so doing is no less urgent than it is apparent, and we are glad to see that prominence is given to this question in a descriptive leaflet of the Coolidge tube, dated October 31, 1916, issued by the British Thomson-Houston Co., Ltd.

This memorandum contains a description of the tube, its mode of construction, and the methods which are now generally employed in its manipulation, both for radiographic and for radio-therapeutic work.

Considering the ease with which the Coolidge tube may be manipulated, and the short time which is required by anyone conversant with X-ray matters to acquire the necessary technique, it must be inferred that the only hindrance to its more general adoption in this country is the high cost of the tube.

The Coolidge tube may perhaps be looked upon as the most successful practical application which has yet been made of the classical work of Prof. O. W. Richardson on thermionic currents. We trust that the British Thomson-Houston Co., Ltd., which states that it is the owner of the English patents of this tube, will be instrumental in putting the Coolidge X-ray tube within the reach of a wider public than exists to-day.

## THE ROYAL OBSERVATORY, GREENWICH.

THE report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich, was presented at the annual visitation of the Observatory on June 1. A few of the matters dealt with in the report are here summarised.

The catalogue of stars down to 9·0m. on the B.D. scale between the limits of 24° and 32° of north declination has been completed by the determination of