

the probabilities are that the strips of photographs that they produce will be badly curved and leave gaps between them, while the individual photos will be tilted up to about 6 degrees and taken from varying heights. In such circumstances accurate compilation is almost impossible unless a map already exists, and, even then, re-section and re-projection of individual photos will be necessary if anything but the roughest results are to be obtained. The gaps that have been left between strips will, moreover, have to be filled up; and, as this is not an easy operation, several additional flights may be necessary for a satisfactory completion of the mosaic.

We are, for these reasons, definitely of the opinion that to employ crews that are not specially practised in the work is to court certain failure; at least in the earlier stages, before experience has been gained.

Special equipment, such as gyro rudder controls, etc., is, in our opinion, necessary for continuous successful work at the rate we have indicated, namely 100 square miles a day. Should the gyros break down in the field, it would be possible to carry on for a time in the absence of any gyroscopical aid, but the strain on the pilot would be so greatly increased that his work would deteriorate seriously unless he confined himself to considerably less work than we have indicated for a single flight.

It is also important to use a stable aeroplane, having adequate accommodation for the observer and his camera and for the pilot's special instruments. We have ourselves used a tractor (D.H. 9a), but we consider that a pusher would be far more satisfactory on account of the better view downwards, sideways, and forwards.

#### SUMMARY.

We have shown that it is possible to carry out aerial surveying by vertical photographs at the rate of 100 sq. miles to the day's flying. When working in moderately flat country the results so obtained can be worked up into 100 square mile mosaics which, when reduced to a suitable scale, will fit a true map within 100 yards at all points. If so desired these maps can be adjusted to fit any number of control points with very little extra labour. If these control points are spaced about 10 miles apart, the absolute error of any point on the mosaic should be less than 100 yards, but, if more closely spaced control points are available, the errors can be reduced, reaching a limit of something less than 20 yards, when the spacing is reduced to one mile.

If the available control points are spaced more widely than 10 miles apart, a measure of control can be provided from the air by navigational methods. We estimate that, even when the control points are spaced so far apart as 50 miles, we could in this way control the position of the 100 square mile units within  $\frac{1}{4}$  to  $\frac{1}{2}$  mile. We are working on this problem at present.

The maps can be made throughout from contact prints off original negatives, no re-projection of individual photos being necessary.

Triangulated points, forming any convenient pattern, can be used as control points; e.g. previously existing primary, or secondary, triangulations could be used.

The methods are dependent on there being sufficient detail visible on the photos to allow them to be joined correctly; they would not be practicable on absolutely featureless deserts or prairies.

Specially trained, picked crews using suitable aeroplanes, specially equipped, are necessary for success.

#### Obituary.

COL. G. F. PEARSON.

ON April 25, Col. George Falconer Pearson died at Kington, Herefordshire, aged ninety-six years. He was one of the last, if not the very last, of devoted servants of the Crown who joined the Indian service some time before the Mutiny, and became a distinguished pioneer of systematic conservancy of the Indian forests.

Pearson commenced his service in the 33rd Regiment of the Madras Light Infantry in 1846, in which he became adjutant, and he also acted for some time as A.D.C. to Sir Herbert Maddock. He happened to be on leave at home when the Mutiny broke out, but returned at once to India and joined his regiment in the Central Provinces, where he was employed in the chase of Tipoo Sahib and other rebels. After the Mutiny he raised a force of military police, 600 strong, with which he put down general lawlessness in the province.

Having thus become well acquainted with the extensive forests and the various tribes living in and around them, Mr. Temple, the Chief Commissioner, appointed Pearson the first Conservator of Forests of the Central Provinces in 1860. Pearson, being endowed with an iron constitution and great energy, devoted the next eight years to the organisation and administra-

tion of the 20,000 square miles of Government forests in the province, selecting and demarcating reserves, introducing a system of regulated utilisation, starting a successful method of protecting the forests against the annually recurring forest fires, and regulating shifting cultivation; in other words, substituting a regular system of management for the method of reckless devastation of the past. His success brought him the special thanks of the Government of India for his valuable services.

In 1868 Pearson was transferred to the charge of the forests in the North-west Provinces, where he reorganised the department, estimated the yield capacity of the forests, and opened out the hill forests by the construction of roads, bridges, and timber slides, by which large quantities of timber were brought down to the plains for railway construction. In 1871 he was appointed to act for Dr. Brandis as Inspector-General of Forests, and in 1872 he left India to take up the appointment of director of studies to the British forest probationers at Nancy, a post which he held until 1884. On his final retirement he settled at Kington, where he lived for thirty-nine years, being a J.P. and the friend of all classes of the inhabitants.

Pearson, though not specially educated as a forester, energetically absorbed and utilised the leading principles of rational forest conservancy, and took a great part

in the introduction of a system of rational forest management in India. He recorded his experiences and ideas in numerous reports, and he published a book on his "Reminiscences" of his activity in the Central Provinces. He was a great judge of character, and he succeeded in becoming the friend of those who served under him, while stimulating them to energetic action similar to his own. While at Nancy, he overcame in a short time the difficulties which had sprung up before his arrival, and his influence upon the students was highly beneficial; in return they loved and admired him. His younger son is a distinguished member of the Dehra Dun Research Institute.

#### CAPT. C. H. RYDER.

NEWS has come from Copenhagen of the death of Capt. Carl Hartvig Ryder, director of the Danish Meteorological Service, on May 3. He had been known to be suffering from rheumatism for some years and lately to find the cares of his official duty onerous; but, to us, the news of his death has come quite unexpectedly.

The Danish Meteorological Office is justly famous for the early production of Daily Weather Charts of the Atlantic Ocean, 1873 to 1876, by Capt. Hoffmeyer, sometime director, a work which was continued by the Danish Meteorological Office and Deutsche Seewarte jointly from 1881 until 1911, with the interval of August 1882 to August 1883, which was covered by the maps of the London Meteorological Office. In 1921 the International Committee expressed the desire for the charts to be brought up-to-date and Capt. Ryder had promised his aid. Further, with its relations to Greenland and Iceland, Denmark is one of the guardians of the farthest North, and for many years the Danish Meteorological Office has compiled all available infor-

mation about ice in northern waters and published with great promptitude year by year reports thereupon.

Capt. Ryder, a naval officer, was appointed director in 1907 on the death of Paulsen. He became a member of the International Meteorological Committee in 1910 and was an indefatigable and most helpful member of that body, especially in regard to weather telegrams from Iceland. By nature he was disposed to work out meteorological progress on conservative lines: he realised that there was still much to be done in improving the data without which there are no adequate means of testing theories. His presence at future international meetings will be sadly missed by his colleagues.

NAPIER SHAW.

#### WE regret to announce the following deaths:

Dr. D. Duncan, formerly director of Public Instruction in India and principal of Presidency College, Madras, and biographer of Mr. Herbert Spencer, on May 18, aged eighty-three.

Dr. Hans Goldschmidt, the originator of the process for the preparation of chromium known by his name and of thermite, a mixture of aluminium and oxide of iron, used for welding iron and steel, and also in incendiary bombs, on May 20, aged sixty-two.

Prof. G. L. Goodale, professor of botany at Harvard University from 1878 until his retirement as emeritus professor in 1909, and president of the American Association in 1890, on April 12, aged eighty-three.

Prof. Immelmann, general secretary of the German Röntgen Society, in Berlin, on April 1, aged fifty-six.

Dr. A. Looss, formerly professor of parasitology in the School of Medicine, Cairo, a distinguished helminthologist, on May 4, aged sixty-two.

Mr. M. de C. S. Salter, superintendent of the British Rainfall Organisation, on May 21, aged forty-two.

Prof. A. G. Webster, professor of physics, Clark University, Worcester, Mass., known for his work on acoustics, aged fifty-nine.

### Current Topics and Events.

WE learn from the Paris correspondent of the *Times* that the celebrations of the centenary of the birth of Pasteur commenced on May 24 with a reception by the French President at the Elysée. On the following day the principal ceremony was held at the Sorbonne, where a plaque was unveiled which bears an inscription recording the meeting between Pasteur and Lister in the Sorbonne on December 27, 1892. This tribute was arranged by the Association France-Grande Bretagne. A visit was paid by the President and the Minister of Education to Pasteur's birthplace at Dôle on May 26. M. and Mme. Vallery-Radot, descendants of Pasteur, have presented a bust of Pasteur, which was unveiled in the Galerie des Glaces at the Palace of Versailles on May 28, and the French President is to unveil the Pasteur monument at Strasbourg on May 31. A cinematograph film tracing the principal events in the life of Pasteur and giving a general idea of his scientific work was exhibited on May 24 to more than 3000 school-children in Paris, and considerable sums in aid of French laboratories have been collected by the sale of Pasteur badges in the streets. A new

French 10-centimes postage stamp bearing the effigy of Pasteur engraved by Prud'homme has been issued to mark the occasion of the centenary. We hope to publish later an account of the celebrations by one of the British delegates.

As recorded in our columns, the late Arthur William Bacot, entomologist to the Lister Institute of Preventive Medicine, one of the most brilliant and original investigators in the field of medical entomology, lost his life a little more than a year ago in the course of an experimental inquiry into the rôle of the louse in the transmission of typhus. Several of Mr. Bacot's friends and colleagues have thought that some memorial of him ought to be established in the village where he resided and, before his appointment to the staff of the Lister Institute, carried out important medico-entomological researches. Mr. Bacot entered the ranks of specialist investigators from those of amateur naturalists and Nature students, and always attached the greatest importance to the teaching of Nature study in the elementary schools. His colleagues and friends believe that the