one of the recurring difficulties is that of reducing such interferences until they are small enough to be dealt with as corrections.

Almost all the numerical data given in the section relating to full-scale machines are derived from the results of experiments on models in a wind-channel. Care is necessary in making the application, and the report contains a comparison between tests on model and full-scale wings. The law of dynamical similarity indicates the possibility of a difference, and although the experimental results are not all that could be desired, they furnish a first approximation to one of a series of scale correction factors.

As a result of model experiments it is now possible to try full-scale experiments of a somewhat detailed character.

Other parts of the report deal with calculations of the stresses in the wings of aeroplanes, both in the internal structure and in the fabric. Systematic investigation of the strength and extensibility of fabric used for aeroplane covering is in progress. The report generally gives detailed descriptions of each of the tests, the results being expressed in many cases in the form of curves.

THE BRITISH ASSOCIATION IN WEST AUSTRALIA.

PERTH, AUGUST 4.

THE Australian meeting of the British Association has already been very successfully inaugurated, to-day being the last spent by the

FIG. 3.—BE2 showing fin experiment F and buffer landing gear B. From "Technical Report of the Advisory Committee for Aeronautics for the Year 1912-13." By permission of the Controller of H.M. Stationery Office.

The test illustrated in Fig. 3 relates to the automatic banking of a flying machine, and the detail changed is the upper end of the wing struts. These had been shown by model experiments to become effective fins and therefore suitable for such an experiment.

For measurements of the resistance of hydro-aeroplane floats apparatus must be used in which the surface waves can be reproduced, and work of this character is carried out in the William Froude National Tank. The report gives drawings and the results of experiments for a new type of float having a low resistance.

NO. 2343, VOL. 94]

advance party in Western Australia and the first of the main party travelling by the *Orvieta*.

The Western Australian delegation, numbering close on seventy visitors, has remained a week in the Western State, and this time has been devoted almost entirely to practical work in the country and on the sea. The Western Australian committee from the very first aimed at giving the guests a full week of collecting and investigating, and consequently receptions, garden parties, etc., have been strongly suppressed. That this has been a huge success is evident from the opinions of the visiting men of science, who

consider their week of research in Western Australia has amply repaid them for their long journey from England. No meetings of sections have been held whatever. A number of visitors, chiefly botanists, zoologists, and geologists, arrived early in July in order to spend two, or even three, weeks in the State ending with the official week. The official party arrived by the *Ascanius* on July 28 and the P. and O. mailboat of the same date.

Hospitality had been previously found for all the visitors, and the Government of Western Australia had provided funds for official excursions during the week for the botanists, zoologists, and geologists, together with free railway passes over the State railways.

A very well illustrated handbook had also been printed, and was distributed to the guests on arrival. This handbook is on somewhat different lines from those of the other State handbooks, the articles being chiefly on the sciences represented by the visitors. The various sections include a general introduction by the Hon. W. Kingsmill (chairman of the executive committee in Western Australia); agriculture and climate, by W. Catton Grasby; botany, by C. Andrews and Mrs. C. M. G. Dakin; geology, by A. Gibb Maitland; mineralogy and mining, by A. Montgomery; and zoology, by Prof. W. J. Dakin and W. B. Alexander.

On the day of arrival of the visitors Sir Harry Barron, the Governor of Western Australia, held a reception at which about 2,500 guests were present. The first British Association evening discourse was given the same evening by Prof. Herdman, the title being "Why we Investigate the Ocean," and was very largely attended. Three other lectures have been given in Perth during the week and one in Kalgoorlie. The subjects of the Perth lectures were, "Stars and their Movements," by Prof. Eddington; "The Primitive Methods of Making Fire," by Mr. H. Balfour; and "The Electrical Action of the Heart," by Dr. Waller. The Kalgoorlie lecture by Mr. Buckmaster was on mining education in England.

The excursion parties left Perth on Wednesday morning, the day after arrival, with the exception of a small party of keen geologists which started away under the leadership of Prof. Woolnough, of the University of Western Australia, on the previous day.

Prof. W. J. Dakin, one of the local secretaries for the Western Australia meeting, conducted a large party of zoologists to the famous Yallingup and Margaret River caves, situated near the coast in the south-western corner of the State. This expedition, favoured by remarkably fine weather (exceptional for the season of the year), afforded not only a glimpse of the south-west region, where rain is abundant and the vegetation has many peculiar characters, but enabled the zoologists to visit the deposits where such excellent discoveries of fossil giant marsupials have lately been made by the Western Australian museum staff. These

investigations have been carried out through the munificence of Sir Winthrop Hackett by Mr. Glauert. The remains include bones of two species of diprotodon, the Tasmanian wolf (*Thylacinus cynocephalus*), the Tasmanian devil (*Sarcophilus harrisi*), a giant Echidna (*Zaglossus hacketti*), and a giant kangaroo. Space forbids a description of the cave formations—the caves are water-formed chambers in a soft limestone which is due itself to the action of atmospheric agents on great accumulations of drift sand. The second large zoological excursion was a motor run from Perth to Mundaring Weir. A hunt was made for arthropods, the greatest interest centring, of course, round *Peripatus*. About seventy-five living specimens of the latter (*Peripatoides gilesii*) were collected by the party in a few hours. This excursion was also under the leadership of Prof. Dakin.

The zoologists completed their investigations by a dredging expedition on almost virgin ground, turning up many species new to Western Australia.

The botanists were extremely enthusiastic, and well they might be, for Western Australia is without doubt the pre-eminent State as a "botanist's paradise." To quote the words of Mr. C. Andrews, who was leader of all the botanical excursions, "Nearly four thousand species have already been described, and of the four thousand species about two-thirds are endemic."

The botanists commenced work with an excursion to the Darling Ranges, which occupied a full day. On the following day a longer excursion was made, and the party visited a sandplain district, making their headquarters at the Benedictine Monastery at New Norcia. The third excursion took the party to the interesting Albany district, where, amongst other plants, the famous *Cephalotus* (the Western Australian pitcher plant) lives. The most interesting plant collected here was *Phylloglossum*, but very large collections of the Proteaceae and other characteristic plants were made.

The geologists had a most strenuous week, especially since some of them had put in a hard week immediately before, for the two official excursions covered a fortnight altogether. The first visitors left Perth for Mingenew (two hundred miles north), and spent three days travelling through the Irwin River Valley and examining the Permo-Carboniferous Glacial beds, Marine beds, and Coal Measures. Two more days were employed in excursions in the vicinity of Perth, and the visitors left for Albany on Monday night (July 27). On the following day the geologists of the main Western Australia party arrived and proceeded to Mount Barker (three hundred miles south), meeting the others at that place. The whole party, under the guidance of Mr. H. P. Woodward, acting Government geologist, motored to the remarkable quartzite mountains of the Stirling Range. The last few days were spent in and about the goldfields.

In completing an account of the week in

Western Australia mention must be made of the excellent arrangements for those visitors who were desirous of seeing as much as possible of the State but were not taking the official botanical, geological, and zoological excursions. Mr. Catton Grasby piloted Mr. Golding round the agricultural districts. Mr. Kingsmill and Mr. Battye arranged a week's programme of short local excursions. The Government very kindly arranged a particularly interesting excursion to the timber district at Big Brook and ran a special train, the Premier himself making one of the party. Prof. Ross guided a number of visitors over the wireless telegraphic station, and Prof. Whitfeld conducted a small party to Kalgoorlie.

Special arrangements were made for the overseas party travelling by the *Orvieto* and only having a few hours in Western Australia. The Mayor of Perth entertained the party to luncheon, after motor drives had been taken round Perth. This completed the official visit to Western Australia. Whilst this is being written upon the *Orvieto en route* for Adelaide the party is anxiously waiting for news of the trouble at home, a few tragic rumours having just reached us as we left Perth for the steamer. W. J. DARIN.

DR. W. H. GASKELL, F.R.S.

DR. GASKELL'S unexpected death comes as a shock to his many friends. A few weeks ago he was in full enjoyment of life. His sixty-seven years were lightly borne, and the ailments inseparable from his years had little effect on his buoyant nature. He was actively engaged in putting in book form his views on the sympathetic system, and no one doubted that he had years of barely abated vigour before him. He died on September 7 after a short illness.

Gaskell entered Trinity College, Cambridge. In 1869 he was placed among the Wranglers in the Mathematical Tripos, and in 1872 he took honours in the Natural Science Tripos. He proceeded to a medical degree, and under the influence of Michael Foster began research in physiology. Carl Ludwig's laboratory in Leipzig was the principal centre of physiological research, and Gaskell went to Leipzig. Under Ludwig's direction he investigated the vaso-dilator fibres of muscle. The resultant paper is one of the classical works on the subject.

On returning to Cambridge Gaskell took up the study of the mechanism by which the several parts of the heart are coordinated in the sequence of contractions which make up the heart-beat. At this time the dominant—though not unquestioned—theory referred the sequence of contractions to the activity of separate groups of motor and inhibitory nerve-cells placed in the heart itself. Gaskell at first supported this hypothesis with certain modifications, but as the result of later investigations chiefly on the heart of the tortoise, he substituted for it the theory, now almost universally adopted, that the conduction of impulses from one part of the heart to the next

is by means of a specialised muscular tissue. At approximately the same time Engelmann contested the theory of nervous control, and the modern views of the mechanism of the heart-beat are inseparably connected with the names of Gaskell and Engelmann. Gaskell's work was full of new and important observations. Thus he described how, by lowering the conductivity of the tissue between the auricle and the ventricle, the ventricle only responded to every second and third contraction of the auricle. On the invention of the string galvanometer by Einthoven, the "heart-block," described by Gaskell, explained certain irregularities observed in the cardiac tracings of man, and became of fundamental clinical importance.

In connection with the foregoing work, Gaskell investigated the extrinsic nervous supply of the heart, *i.e.* its innervation by the vagus and sympathetic nerves. He was thus led to his next great line of work, that on the sympathetic nervous system. On this question there were a vast number of observations, but for the most part they were disconnected, and few generalised statements had any currency. A distinction of white and grey rami connecting in the mammal the spinal nerves with the sympathetic had long been known, and Onodi and others had described the absence of white rami in the cervical, lower lumbar, and sacral regions. The white rami were known to be composed chiefly of myelinated nerves and the grey rami of non-myelinated nerves. Gaskell's observations were chiefly microscopical. He noted that the roots of the spinal nerves at their origin from the spinal cord had no non-myelinated nerve fibres, and from this and other facts he deduced as a broad general statement that the outflow of nerve fibres from the spinal cord to the sympathetic chain took place solely, or almost solely, in the regions in which white rami were present, *i.e.* in the thoracic and upper lumbar regions. In Gaskell's paper there are other generalisations with regard to the sympathetic and allied nervous systems, but it would take too much space to discuss them here. It must suffice to say that Gaskell was the first to attempt to treat the innervation of the blood-vessels and the viscera in a comprehensive manner.

Gaskell's study of the relation of the central nervous system to the sympathetic nervous system in vertebrates led him to consider the relation of both to the nervous system of invertebrates, and he passed from the more special domain of physiology to that of morphology. He arrived at conclusions differing essentially from that held by morphologists, and the remaining years of his life were mainly occupied in advocating his views and working them out in detail.

Taking Gaskell's work as a whole, it appears that the main bent of his mind was for generalisation. It was scarcely possible for him to make an experiment without extending the conclusions to be derived from it to a number of other phenomena. It was both his virtue and his defect. His influence on physiological conceptions has