THE CIRCUIT OF BRITAIN BY AËROPLANE.

THE most remarkable race the world has yet seen is over, and Naval-Lieutenant Conneau, flying a Blériot monoplane under the name of "Beaumont," has won the 10,000*l*. offered by *The Daily Mail* for the circuit of Britain—a total distance of 1010 miles in 22h. 28m. 18s. of actual flying time, or just under 45 miles an hour.[1]

The basic idea of the race was to test the trustworthiness of the competing aëroplanes. With this end in view, five parts of the machine and five parts of the engine were marked, viz. the wings, rudder, elevator and fuselage, two cylinders, and various portions of the crank-case.

Two of each of the five parts thus marked had to be in place throughout the race. The motor was marked with an electric needle, the fuselage with burnt-in letters, and the other parts with wired-on lead seals, their position being indicated with red paint on the fabric to assist the examiners at the various controls.

The course was divided into five sections, which were again divided, with the exception of the first and last, into controls, as follows:—*Section* 1.—Brooklands-Hendon (20 miles. *Section* 2.—Hendon-Harrogate (182 miles), Harrogate-Newcastle (68 miles), Newcastle-Edinburgh (93 miles). *Section* 3.—Edinburgh-Stirling (31 miles), Stirling-Glasgow (22 miles), Glasgow-Carlisle (86 miles), Carlisle-Manchester (103 miles), Manchester-Bristol (141 miles). *Section* 4.—Bristol-Exeter (65 miles), Exeter-Salisbury Plain (83 miles), Salisbury Plain-Brighton (76 miles). *Section* 5.—Brighton-Brooklands (40 miles).

Provision was thus made for the competitors to experience every kind of country, while the climate provided, as the event proved, every kind of weather. Twelve hours' resting time on the ground in a control had to be taken in Sections 2, 3, and 4, and no competitor was allowed to start in any of the Sections 3, 4, and 5 unless the full resting time had been taken in the previous section. This wise provision was made to ensure that the competitors had some rest and were not over-driven in the round. The times were taken from the start from one control to the arrival at the next, any stoppages in between counting as flying time, while any resting time taken in any section over and above the twelve hours specified was also counted as flying time.

On Saturday, July 22, the start was made at 4 p.m. from Brooklands. Of the original thirty entrants, twenty-eight were possible starters on the day; but only twenty actually went to the post, and only seventeen got away. Lieut. Porte (Déperdussin monoplane) and F. C. Jenkins (Blackburn monoplane) both fell just after starting, smashing their machines, fortunately without injury to themselves, while Gordon England (Bristol biplane) could not get sufficient altitude to leave the ground. The rest reached Hendon, Védrines making the fastest time, 19m. 48s., winning thereby the right to go first on Monday.

Monday was perhaps the most remarkable day of the race. At the earliest dawn the machines began to fly away to the north, and when night fell they were scattered all along the line from London to Edinburgh. Before noon Védrines and "Beaumont" both reached Edinburgh, where Valentine (Déperdussin monoplane) landed soon after four in the afternoon. Hamel (Blériot monoplane) arrived at Newcastle, Cody (Cody biplane) at Harrogate, and the rest lay between Harrogate and Hendon.

Tuesday night saw both the leaders at Bristol, Valentine at Glasgow, Hamel at Edinburgh, and Cody near Durham. On Wednesday, at a few minutes past two in the afternoon, the race was won, "Beaumont" beating Védrines on time by 1h. 9m. 47s. This result was chiefly due to the fact that the latter mistook the way at Bristol and alighted on the wrong ground, breaking a stay in doing so, and much precious time was lost before he was able to reach the actual aërodrome. Both arrived with all their marks intact.

There is nothing astonishing in the fact that they so far outdistanced the rest of the competitors. They are both acknowledged pilots of the very first rank, with great experience in cross-country flying, while their machines and motors were the pick of their types.

[1] Up to the time of going to press no official times have been issued.

"Beaumont's" Blériot monoplane was of the usual cross-country type, fitted with a 50 horse-power Gnome motor and a Normale propeller. Its total supporting area is 17·5 metres; span, 8·9 metres; length, 7·65 metres; and weight, 230 kilos.

Védrines's Morane-Borel monoplane is very similar to the Blériot, except in its landing chassis, the arrangement of the elevator, and the camber of its wings. In plain view also its wing tips are rounded from front to rear instead of from rear to front like the Blériot. It was fitted with a 50 horse-power Gnome motor and an Intégrale propeller. Its total supporting area is 17·5 metres; span, 9·3 metres; length, 6·7 metres; and weight, 200 kilos.

As aviators steer their way by map and compass, the winner naturally had, owing to his nautical training, a considerable advantage. The chief landmarks to the flyer are rivers and lakes, roads, railway lines, the contours of villages and towns, and the masses of deep colour afforded by woods. Good artificial guides are smoke columns in isolated positions, kites or balloons carrying flags, and white-washed sloping roofs of prominent buildings. A good map must be masterly in its omission of unnecessary detail, and must show distinctly the varying heights of the country and the landing places. One difficulty is the absence of trustworthy news, from the aviator's point of view, as to the weather 100 miles ahead. The opinion of the average man, who has no conception of what constitutes good flying weather, and is not equipped with any apparatus for sounding the air, is quite worthless. As flying becomes commoner we shall, no doubt, see a national system of meteorological stations linked up by telephone or wireless telegraphy. Charts of the atmosphere will be in common use so soon as regular services from point to point are established. Profs. A. L. Rotch and A. H. Palmer have foreseen this, and have just issued a pioneer work giving charts of the conditions prevalent at various times of the year in the vicinity of the Blue Hill Observatory, Mass., especially designed for the use of aëronauts and aviators.

Compasses for aëroplane work have only recently been made practicable. One of the most trustworthy is that invented by Mr. E. H. Clift, and it was largely used by competitors. The difficulty hitherto has been the iron and steel work, the framing, motor, wire stays, and so forth that are used on every aëroplane. A deflection, sometimes as great as 30°, is consequently set up, which has to be corrected by "swinging," that is to say, the head of the machine is moved to every point of the compass in turn, and the errors noted and brought to their lowest dimensions by means of magnets and soft iron balls and bars. Errors are then tabulated and reduced to a curve, which can be plotted to accord with the direction of flight. From this it can be seen that compasses are still far from perfect, and are thrown out by the movement of metal parts, their breakage, or removal.

In reviewing the race, one is inclined to regret that the biplanes showed up so badly. The cry has gone out that the biplane is dead. This, of course, is sheer nonsense. One of the finest machines built is the Curtiss biplane; the Wright biplane holds all the duration records in America; the Bréguet biplane holds the record for weight-carrying; the Cody biplane may not be very fast, but it is stable and trustworthy; the Bristol biplane went round the European Circuit in very creditable time; and the Roe biplane has shown what can be done in the way of speed. The monoplane for scouting, for racing, and perhaps for ease of transport, has proved itself superior, but the biplane has many points in its favour which cannot be disregarded. Another machine one would have wished to see do better was the Etrich monoplane, flown by Lieut. Bier with Lieut. Banfield as passenger, which, as the outcome of years of labour, is probably the most scientifically constructed monoplane, both from the aëronautical and engineering point of view, in existence. It broke down, like many others, from engine trouble.

People viewing the race from a distance, or by the more convenient method of newspapers, are inclined to entertain the idea that man can now get up and soar away to the ends of the earth on his lawful occasions with very little trouble, but they reckon without all the vital factors that make for success. First and foremost is the mechanic. Oily and dirty, often starving, usually exhausted to the point of collapse from want of sleep, he follows where the machine leads him. No other but he can tend his own machine; he knows its ways, its moods, and its weaknesses. The touch of his deft fingers removes all cause of complaint and freshens up every flagging part. Then he stands back, watching the white wings sail up into the sky; and they are scarcely out of sight before he takes the road again in his car to follow, anxious, fretful, but enthusiastic, to where his master leads. This is a side of flying as heroic as that of the pilot and as necessary, but gaining no applause and no glory.

A big race is won by everything being of the best—picked pilot, picked machine, picked motor, picked mechanics, and perfect organisation. If one fails, all fail. And here, perhaps, our English temperament fails. Nothing in flying is "good enough," as we are inclined to think; *it must be the best.*

THE BIRMINGHAM MEETING OF THE BRITISH MEDICAL ASSOCIATION.

THE proceedings in the Section of Electro-therapeutics and Radiography of the meeting of the British Medical Association, held in Birmingham on July 25–28, were of scientific as distinguished from purely medical interest. A form of treatment is being introduced in which the ions composing the drugs are sent into the diseased part—skin, nerve, joint—by means of the electric current, that is, by kataphoresis. For instance, a preparation of salicylic acid is ionised by the current, and thus introduced into a nerve—facial or sciatic—in a case of neuralgia with a directness and intensity not attainable by the method of solution in the blood. The consensus of opinion at the discussion was that this, the latest, form of medication was exceedingly useful, not only in neuralgia, but in many joint affections. The speakers agreed that we had yet a great deal to learn, as, for instance, how deeply the ions can penetrate and how many milliamperes it is best to employ.

The utility of this method in cases where the drug which has to be used would disturb digestion, is very obvious, and it is also probable that the drugs introduced by the method of ionisation act more energetically than if they had reached the part through the blood and lymph.

Sir Oliver Lodge addressed the section on the theory of electrical conveyance through solids, liquids, and gases. In solids, he said, the travelling electrons, which were negative in charge, moved through the solid matter; in liquids the electrons, which seemed to be charged negatively and positively in about equal numbers, travel along with the more mobile matter, whereas in gases the current seemed to consist of positive electrons moving independently of the molecules of the gas.

If we rarefy a gas—remove a great many of its molecules or allow it to expand until it fills a much larger space—the electrons are accelerated, and this acceleration is accompanied by a fine shimmer of light, and in certain cases by sound—a cracking noise. The kathode rays are due to the rush of electrons suddenly stopped by a metal plate or target. Sir Oliver concluded by demonstrating his well-known electric valve, a device whereby he permits electrons only of one sign to accumulate, and rejects the others by a series of ingenious "traps." In this way he can, for instance, dose plants with electricity of one kind only, a treatment which has given the most encouraging results in the ripening of wheat, tomatoes, and other vegetables on quite a large scale.

The joint meeting of the Section of Therapeutics and Dietetics with that of Anatomy and Physiology was for the purpose of discussing the problems associated with the work of Prof. Chittenden, of the department of physiological chemistry at the University of Yale, U.S.A. Prof. Chittenden holds, as the result of observations on a large number of persons selected at random, that the usually accepted quantity of protein food for the adult, 118 grams in the twenty-four hours, is excessive. One series of experiments extended over 130 days, so that the charge of insufficient data cannot be brought against the Yale researches. Prof. Chittenden gives about 70 grams, or less than half the German standard, as sufficient; and his contention is that, because the majority of mankind take much larger quantities of protein food, we have no right to assume that this has a scientific basis. He believes the time has come for dietetics, as for all else, to be studied by the methods applicable to other scientific problems.

It is admitted by the Yale school that the amount of nitrogen in food is no measure of our energy requirements, and that, provided we obtain from fats and carbohydrates the amount of potential energy necessary for the daily kinetic output, then the minimum of protein constitutes what we might also call the optimum. Chittenden's work is so well known in this country through his book "Economy in Nutrition" that it need only be said that, as regards analysis of the food and excreta, it is as careful and complete as could be desired. Although it may be proved that the subjects of his experiments were perfectly vigorous on their restricted diet, one failed to learn from Prof. Chittenden what were the bad results of taking more protein than the 70 grams. He said it "stimulated metabolism generally"; but, as one speaker pointed out, this is not in itself a bad thing, as the more active tissue-change is, within limits, the better is the physical and mental health of the individual.

Some speakers who followed in the discussion held that the usual quantity of protein ingested did no harm whatever, while others asserted that protein in excess of Voit's quantity of 118 grams gave rise to excessive intestinal putrefaction and toxæmia, with raised blood-pressure and gouty arterio-sclerosis.

The diets of poor Orientals are not to be quoted as exemplifying the benefits of a low protein intake, since they are indigestible and dietetically insufficient in many ways. The low stamina and frequent anæmia of these races is due to the deficiency in absorbable nitrogen, and an improvement is noticeable so soon as these people are able to afford the more generous *régime* of the European.

According to Dr. Provan Cathcart, the quality, and not the quantity, of the protein is the important matter physiologically, for the nearer the composition as regards the constituent amino-acids approaches that of the tissue-protein of the animal being fed, the less will there be of nitrogenous waste from that animal. Thus dogs wasted less nitrogen when fed on dog-flesh than on any other kind of protein.

In a paper by Dr. Fraser Harris on some physiological aspects of mine rescue apparatus, there were several points of scientific as distinguished from medical interest. For the last two years a committee of the South Midlands Coal Owners' Association has been investigating the various types of self-contained breathing apparatus for saving life in mines after explosions and underground fires. All the following types of apparatus were examined:—Aerolith, Draeger, Fleuss, Meco, Weg, Hall-Rees, and bellows and helmet. Each has its characteristic feature: in the Aerolith liquid air evaporates; the Draeger, Meco, and Weg supply pure oxygen, compressed under 120 atmospheres, at the rate of 2 litres a minute; in the Fleuss one breathes into a large bag in which sodium hydrate in sticks absorbs the carbonic acid gas. The Hall-Rees is used chiefly for submarine work, and in it oxygen is liberated from sodium-potassium peroxide, in which the carbonic acid gas is simultaneously absorbed.

A point for which the committee was not prepared was that the helmet is far from an ideal mechanism. To a person who has never worn a helmet or done hard work in a metal case, which entirely covers the head and face, the helmet seems the very thing required; but he soon finds that the face becomes excessively hot from the absence of ventilation, and the glass window becomes dimmed from the non-evaporated moisture, and, most serious of all, one's range of vision above and to the sides is very limited. This limitation of vision is particularly serious when one is crawling on hands and knees, which in mines it is often necessary to do. The enclosing of the whole head in a helmet diminishes one's power of hearing, a matter of some consequence, since the possible warning of falls from the roof cannot be heard. The committee favoured half-masks and nose-clips, with motor goggles rather than helmets. In order to make the helmets smoke-tight round the face, an indiarubber tyre has to be inflated, and in the