May 26th 1933. Vol. 4, No. 10.

THE SAILPLANE & GLIDER

Official Organ of the
British Gliding Association

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THE SAILPLANE & GLIDER

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The only Journal in the World devoted solely to Motorless Flight.

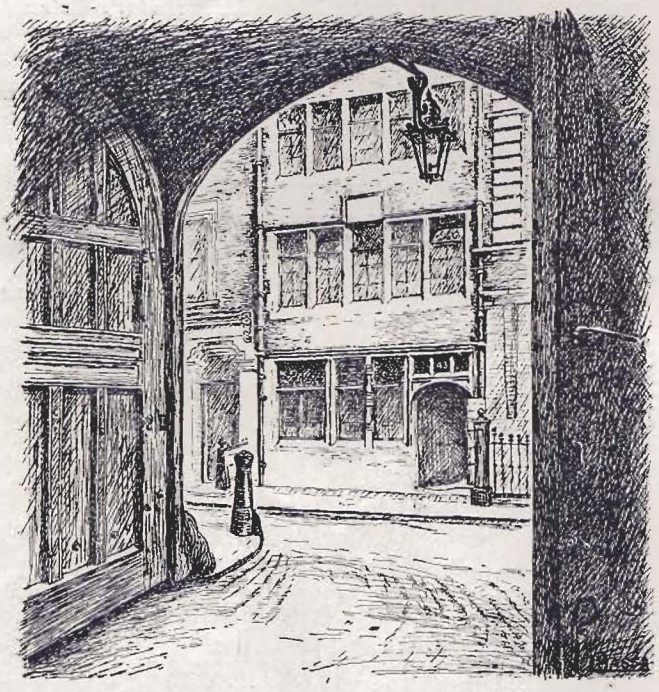
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The Offices of the SAILPLANE *viewed from the historic XVIth Century gateway of Lincoln's Inn.*

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Another Milestone.

What, in a Gliding Movement, constitutes a milestone? There are two points of view. According to one, it is anything which brings the movement publicity, such as aerobatic displays, gliding over the Channel, being towed behind an aeroplane, carrying mails, or getting some well-known personage interested—in fact, anything but using a sailplane for the purpose for which it was primarily intended.

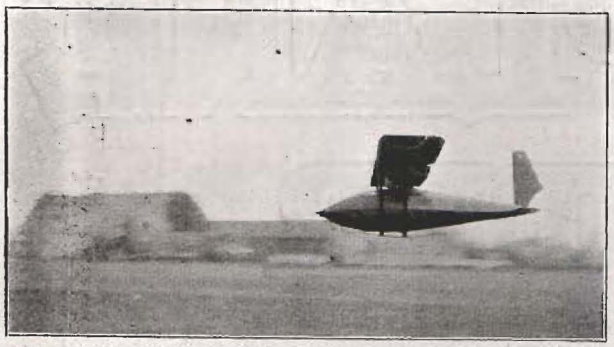
But these are not milestones; they are finger-posts pointing down blind alleys. A side-track is only of use if it leads *into* the main line of progress, not out of it.

The real milestones are those which register progress in in the art of motorless flying. By their very nature they can hardly be given publicity among a public which regards soaring flight as a freakish performance only made possible by some temporary aberration of the laws of Nature. Among such milestones in the British gliding movement, we would place the first "A," and later "C," certificates obtained by a British-trained *ab initio* pilot (Mr. Graham Humby, July, 1930, and February, 1931); also the first use, by a British pilot, of clouds for soaring independently of a hill (Mr. G. M. Buxton, August, 1931).

The Furness Club's Achievement.

The obtaining of the first "C" certificates by the Furness Club, recorded in the Club News, can surely be regarded as such a milestone. The Club claims that its membership is entirely *ab initio;* it has never had an instructor with any experience either of power flying or of soaring.

David Garnett, in his book "A Rabbit in the Air," compares aeroplane tuition to the "laying on of hands"; ever since the introduction of dual control, the "feel of the hand on the stick has been passed on, in a kind of Apostolic Succession, from instructor to instructor, all the way down from the few original pioneers of the early days who had to teach themselves to fly. There is something of the same kind, though in less degree, in gliding instruction; the pupil, though he is alone in the machine, yet learns from an instructor, who has been taught by another instructor in his turn. But not so with the Furness Club. They have taught themselves to fly like the early pioneers. And, as is fitting in this country, they have achieved success in a sea breeze, with the sea on one hand, mountains on the other, a broad estuary below, and the gulls for company.



The Enser Research Sailplane in flight on the Great West Aerodrome on April 16th. At the time, there was hardly enough wind to lift the wind-sock, and the machine is shown about 15 feet up at the end of a glide and about to land.

THE B.G.A. COMPETITIONS.

The meeting is to be held from June 15th to July 16th inclusive, the dates being postponed a fortnight from those originally proposed, for agricultural reasons.

A letter from the Secretary of the B.G.A., describing the arrangements, appears in our correspondence columns.

FATAL ACCIDENT TO MR. LOWE-WYLDE.

We have to record with deep regret the death of Mr. C. H. Lowe-Wylde in a flying accident near Maidstone, on May 13th.

Mr. Lowe-Wylde had been demonstrating one of his new DRONE light aeroplanes (an adapted B.A.C. VII. glider fitted with a Douglas motor-cycle engine) to the Maidstone Aero Club and Flying School. Having landed to make some minor adjustments, he took off again and climbed to about 800 ft. After he had flown round for some twenty minutes, the machine was seen to go into a steep dive with the engine full on; then, after a partial recovery, it tilted over sideways and continued in that attitude till it hit the ground, with the engine still running.

The cause of the accident remains obscure, but it seems to be generally agreed that, to judge from the behaviour of the aeroplane, the theory most likely to be true is that Mr. Lowe-Wylde was taken ill while in the air, especially as he was known to be suffering from the effects of overwork at the time. At the inquest, which was held at West Malling on the 16th, a verdict of "accidental death" was recorded.

The funeral took place at Hither Green Cemetery on May 17th, and was attended by representatives of the British Gliding Association (of whose Council and Technical Committee Mr. Lowe-Wylde had long been a member), and of several gliding and other flying clubs.

His loss will be deeply felt in aviation circles, and especially in the gliding movement, which owes so much to him and in which he has so many friends. On our own behalf and that of our readers we offer our sincerest sympathy to his relatives, and to his co-directors of the British Aircraft Company, Mr. K. B. Green and Mrs. Green.

A short account of his life and work for the gliding movement appears on another page.

THE BLIND FLYING SAILPLANE COURSE.

The first course of blind flying instruction in sailplanes ever held was concluded on March 31st at the Griesheim aerodrome, near Darmstadt, after lasting 10 days. Herren Riedel, Krebs and Hubert were the instructors, also Capt. Balz, who has had much experience in blind flight. Herr Stamer supervised.

About 100 flights were made by the special two-seater built for the purpose. Each pupil had 12 flights, totalling about two hours of actual blind flying. Both instructor and pupil wore parachutes. The machine is designed to stand up to high speeds, and once during the course a pupil reached 106 m.p.h.!

U.S.A. MEETING.

The Annual National Soaring Contests in the U.S.A. will be held on the Elmira site, New York, from July 10th to 23rd inclusive.

MAYER OF AACHEN KILLED.

We learn with much regret that Dr. Hermann Mayer, of Aachen, the famous sailplane designer and pilot, was killed on May 7th in a crash due to structural failure in the air.

According to *Flugsport*, the machine was one of his own sailplane, of M.S.2 design. He had cast off after a towed flight in very gusty weather, and in making a sharp turn the tail twisted off.

We learn from another source that the occasion was a flying meeting in Münster, Westphalia. He was soaring over a small hill about 75 ft. up when he developed structural failure in the tail. This developed comparatively slowly and was apparent to people on the ground, but he appears not to have noticed it.

Mayer was well known for the series of successful sailplane designs he brought out. They were comparatively lightly built, and flew well under the most diverse wind conditions. Several were always to be seen at the Rhön meetings. Last July, at the Rhön, during a long-distance flight, he reached a record height of about 10,000 ft. above sea level. The start of this flight was made from the low south slope, over which pilots rarely make cloud contact.

His death will be a severe loss to German motorless flying, as, in addition to his skill as a designer, he stood in the first rank among soaring pilots.

GLIDING CERTIFICATES.

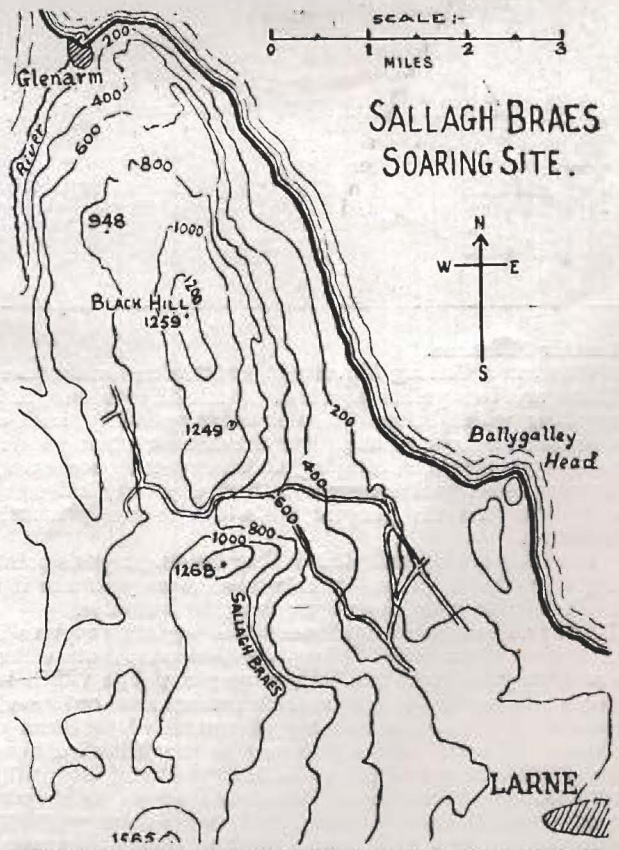
On April 26th the Royal Aero Club granted the following gliding certificates:—

No. 322, W. Eisenstadter, "B" Certificate, qualified on April 9th.

No. 323, R. A. Scott, "C" Certificate, March 18th.

No. 192, G. O. Smith, "C" Certificate, April 2nd.

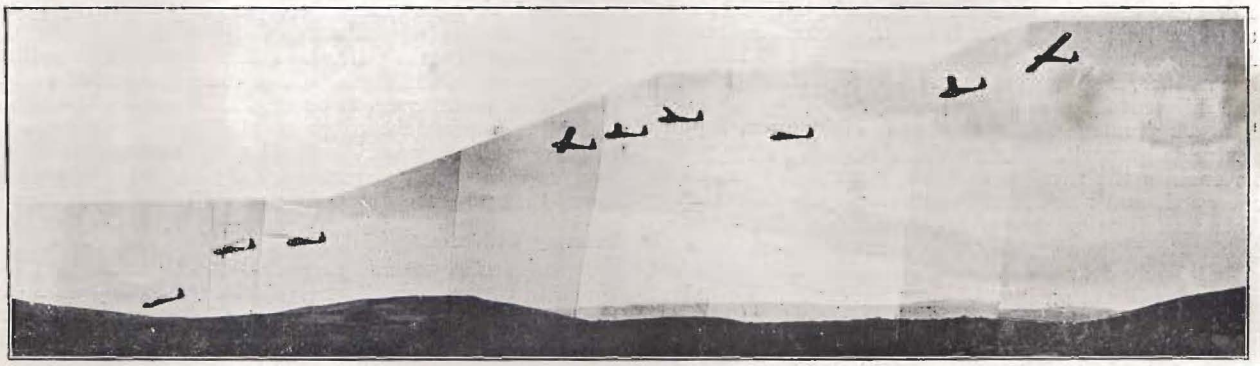
All three qualified at the London Gliding Club.



The Ulster Club's newest soaring ground. See article on next page, also Club Notes in our last issue.

LANDING IN THE DOWN-DRAUGHT

By J. P. MACKIE.



The above picture is intended to convey an idea of the "Waygood Otis" sensation obtained by descending in a sailplane in the down-currents prevalent behind a steep ridge. The machine is the Ulster Gliding Club's KASSEL 20. It will be observed that nine pictures of the machine are shown. These were taken originally by a cinema camera, the exposure being at the rate of sixteen pictures per second. An enlargement was made of every 41st picture, thus giving an interval of approximately 2½ seconds between each one. Unfortunately the camera was momentarily stopped between the third and fourth position from the left, which leaves a doubtful factor at this point. The assembly of the separate pictures was done by lining up the horizon, which, due to the uneven contour, could be done with reasonable accuracy. The machine is gliding at approximately right angles to the camera. The pilot states the average speed shown on the indicator was 50 km. per hour. By measurement the greatest drop is shown by the two last positions, which indicate an approximate fall of 10 ft. in one second. This is approximately four times the machine's normal rate of descent, assuming a normal flying speed of 50 km. per hour, and a gliding angle of 1 in 16 actual. At the start of the descent the machine was 600 ft. above the ridge. The picture only shows the last portion of the descent. As a rule, figure-of-8 curves are necessary, the nose of the machine being kept well into wind. The landing point of the machine is approximately 50 yards behind the edge.

The accompanying two photos give an idea of the soaring ground. The upper picture shows the northern termination of Sallagh Braes, known as "Knock Dhu." The height above sea level is approximately 1,250 ft. This ridge is ideal for a N.E. wind. The sea is not far away; it can be seen in the lower picture. A steady wind is usually found at 600 or 800 ft. above the ridge, and the machine is particularly comfortable if it were not for the thought of getting down again.

Perhaps if anyone knows a better method than the "Waygood Otis" they could make suggestions. The idea of losing height away from the ridge to windward, flying down-wind and alighting on top has occurred to some pilots, but the possibility of not getting over the brink of the cliff has, so far, ruled it out.



BIRD FLIGHT X: THE STRUCTURE OF FEATHERS

By C. H. LATIMER-NEEDHAM, M.Sc.(Eng.), F.R.Ae.S., F.Z.S.

The general conception of feathers is to regard them as consisting each of a central shaft supporting vane-like protruberances on both sides, so that a number of feathers, placed over one another, in layers, produces the formation of wings, or other surfaces, or merely a protective covering where warmth is required; whereas, in fact, the structural properties of feathers in their many diverse shapes and forms constitute a highly specialised branch of design. Between the soft down of a swan, or of an owlet, and the firm, knife-life wing-tip pinions of an eagle, there are many variations in size and shape according to the different purposes served.

Fundamentally, it is true that the essential components are, in all cases, the main supporting shaft, or quill, together with the barbs which spring from it, but a close examination reveals interesting features sufficient to fill a book. It has already been seen how the edge of the main alula feather curls over to the shape of the wing leading-edge; how tiny feathers may be present to enforce this curl-over; how the shaft position in emarginated primary feathers is carefully adjusted so that the air force acting produces a twisting effect, and also how the relative width of the vanes of secondary feathers vary according to the necessity, or otherwise, of the feathers opening up, or parting, on the up-stroke.

The most striking property of a feather is, of course, its proverbial lightness, but when it is fully realised that the whole weight of the bird, and even more, is borne entirely by the wings and tail, that loadings as great as 2 lbs. per square foot are not uncommon, and that practically the whole wing is built up of feathers (for what is a wing devoid of its feathers?), then our surprise is even greater. The methods by which such extreme lightness is obtained will be explained later.

The bird's wing is not by any means a haphazard mass of feathers, but consists of a well-ordered, carefully-designed lay-out, without a single superfluous feather. This does not mean to imply that flight becomes impossible, nor necessarily greatly impaired, by the loss of one or more feathers, since such a contingency has been allowed for by Nature, but it is doubtful whether absolute maximum efficiency can be obtained after the loss of a single feather, although, of course, the relative importance of the different feathers varies greatly.

A bird's plumage is changed once every year, a point of extreme importance from the structural standpoint. This enables the ravages of time, wear and tear, to be made good, and most likely counteracts the depreciating influence of time on the strength qualities. Incidentally, this last factor, in all probability, accounts to some extent for the widely different design of the wings of birds and insects; the life of an insect being, generally, of so short a duration that a change of wings is not essential.

In most bird species moulting is carried out over a somewhat prolonged period, during which time the feathers are lost and replaced in pairs, so that flight does not become seriously hampered. Certain types, however, effect a rapid moult and are thereby prevented from flying for some days.

The open wing, for the greater part, consists of one layer of feathers, or, at most, two, and it is only over the forward part where the covert feathers are found that the number of layers is increased to three or four. The purpose of these smaller feathers is twofold, partly to help support the primary and secondary quills, and in part to increase the wing thickness over this area. In the neighbourhood of the leading-edge it is true that there are many small feathers, the minor and marginal coverts, which provide a well-shaped leading-edge with a smooth, soft surface.

Yet the open wing is impervious to the passage of air. The edges of most feathers are provided with tiny hooks which hold fast to the adjacent feathers. Graham has stated that the main purpose of these hooks is to prevent over-opening of the feathers, but the provision of an air-tight joint would seem to be of at least equal importance. A simple experiment to prove the impenetrability of a feather, or of a properly ordered wing, can be carried out by blowing cigarette smoke against one face, when it is found that no trace of smoke escapes to the other side.

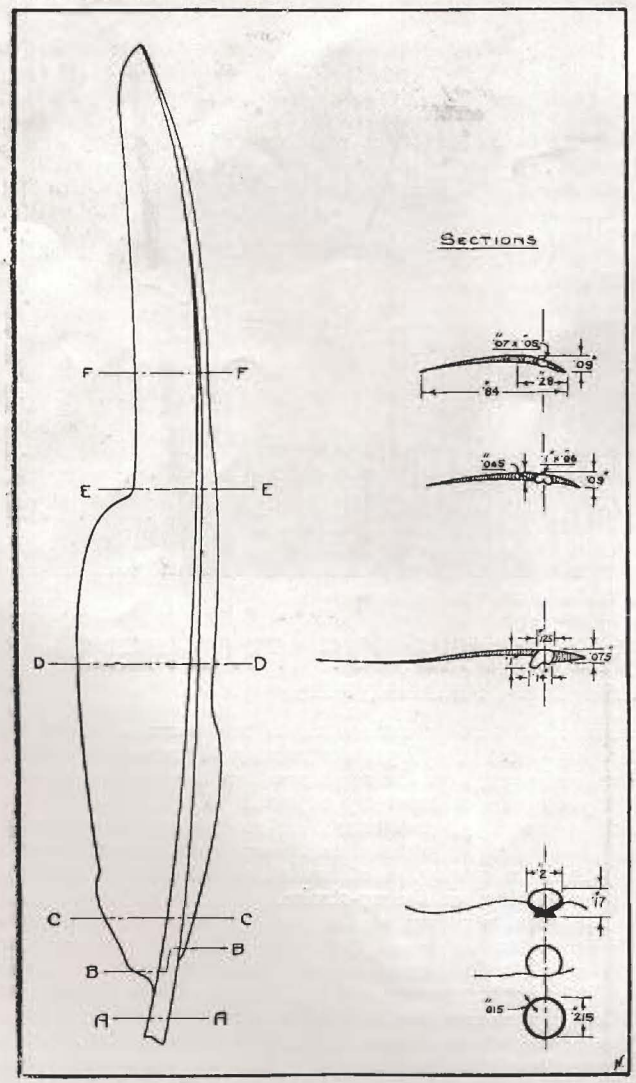


Fig. 28. Primary Feather of Spotted Eagle; approx. half-size. Sections nearly full-size.

Primary Feathers.

Perhaps the greatest scope for investigation is to be found in the primary feathers, forming, as they do in the case of emarginated wing-tips, small winglets, complete in themselves. Fig. 28 shows the second primary of the Spotted Eagle, an habitué of the Persian Gulf, and is quite typical of the feathers of birds with well-slotted wings. The peculiar shape due to the cut-away, slot-forming portion is immediately apparent and it is also noticed that the slot to the front, i.e., between the first and second primaries, comes further in towards the wing root than the rear slot. The part beyond the point where the reduction of the rear vane commences, that is, over the length which is reduced along both edges, is a complete aerofoil in itself and is not influenced by the remainder of the wing to any great extent, except for the downwash from the first primary and perhaps a slight upwash in advance of the third feather, and this part should, therefore, prove of the greatest value to the investigator.

A number of sections, at the positions indicated in Fig. 28, has been obtained, and these are given, together with the leading dimensions, to a scale of twice that of the feather. Several points of considerable interest are brought out by these sectional views.

Dealing first with the shaft, or quill, which consists of a semi-transparent, horny substance of high strength qualities, it is noticed that the shape at the root is very nearly circular, of diameter a little less than one-quarter of an inch and about fifteen thousandths of an inch in thickness. At section "BB," where the vanes commence, the barbs spring from the bottom of the shaft. A little further on, at section "CC," a flat has appeared on the underside, after which the section becomes elongated sideways, like the shape of a bean, until near the tip, where the shape becomes more or less oval.

The reasons for these various shapes are that where the greatest torsion has to be resisted, i.e., near the root, the tubular section is most efficient and economical, whilst the flatter section over the outer part is dictated by the aerofoil requirements of that part. The serrated section is in all probability for elastic stability, and it is not unlike the shape given to present-day metal spar sections, where the same property is of extreme importance.

Considering next the feather sections illustrated, it is noticed that sections "EE" and "FF" are very similar and are perfect wing shapes; in fact *the whole length of the emarginated portion of the primary feather is of true aerofoil section*, which is a most remarkable feature.

Section "DD" was purposely taken over the portion where the anterior web is curtailed but where the posterior vane is of full width, that is to say, where the front edge only is separated from the adjacent feather, and here we find another astonishing feature in that the front vane only is shaped like an aerofoil, but that behind the quill there is a sudden decrease of thickness; the explanation being that the wing section in the latter case is built up from a number of feathers. A further, but minor, characteristic is provided by the upturned trailing-edge over the inner portion of the feather, which thus ensures close contact with the adjoining feather.

There is no pretension to wing shape over the non-emarginated part, nor, of course, is there any need for such, since, here also, it merely forms part of the whole.

The several sections have been fairly accurately repro-

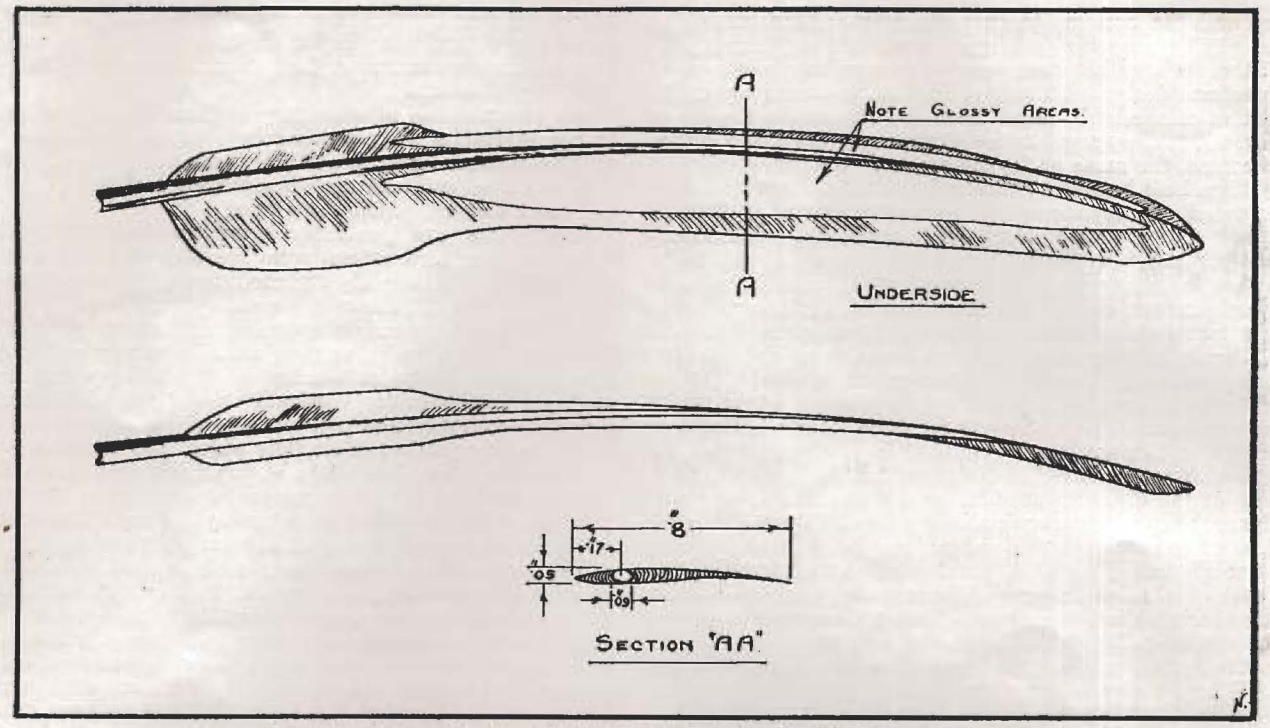


Fig. 29. Primary Feather of Reeves's Pheasant. Nearly 1½ times full-scale.

duced, but obviously there is much scope for further valuable investigation in connection with the sectional shapes of feathers, and it is hoped to continue this part at a later date so as to obtain more accurate details.

A primary feather of the Reeves's Pheasant, of N.W. China, is given in the next illustration (Fig 29). The views are of the underside and an elevation as seen from the front, in which a natural twist, resembling the twist of a complete wing, is clearly seen. It is probable that the twist is entirely removed, and even reversed, when an air load is present, as has been dealt with in other parts of this work. A sectional view is also given, which is not altogether unlike those of the Spotted Eagle, but there is one outstanding difference, that is the degree of camber.

The amount of curvature present in the Eagle's feather is considerable, whilst in the case of the Pheasant the section is very flat. In aeronautical parlance these would be characterised as "high-lift" and "high-speed" wing sections, although, strictly speaking, the difference is only one of speed. In order to bring out this point more clearly, Fig. 30 has been prepared, in which the two feather sections have been brought together for closer comparison, and it is certainly worth considering the wing velocities of the two species. In the case of the Eagle, a bird whose time in the air is devoted almost entirely to soaring flight, the speed with which the wing-tip moves through the air is equal to the bird's flight speed, perhaps about 30 m.p.h., whereas the Pheasant is a fast, heavy flier with rapid wing-beats, so that the wing-tip is likely to attain a speed greatly in excess of the body (see Part III.), and, most likely, of more than twice that of the Eagle. Here, then, is the explanation sought.

A peculiarity of the sectional shape of the primary feathers of certain species examined, notably the White Eyed Buzzard, is the double curvature caused by a "sagging" or inflexion at roughly the half-chord position. The reason for this is at present somewhat obscure, but the shape is reminiscent of the early Howard Wright Double-Camber aerofoil.

The next point for consideration concerns the way in which the depth of the feather section is obtained. This, also, is of extreme interest.

Structure of Barbs.

The barbs are the myriad hair-like projections from the main quill which form the vanes, to which passing reference has already been made. They spring from the shaft at an angle of roughly 45 degrees. Single barbs can be cut or torn from the vanes, but, in dividing one from the rest, it is noticed that there is considerable resistance to such cleavage, due to the strong tendency of the barbs to hold together, which suggests that some sort of attachment must exist, and this is confirmed later by the microscope.

Close examination of the separated barb discloses, even to the naked eye, the presence of small flanges along the

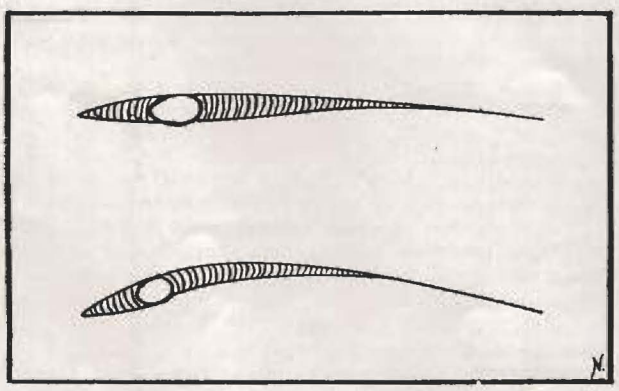


Fig. 30. Enlarged Sections of Primaries: Top, Reeves's Pheasant; Bottom, Spotted Eagle.

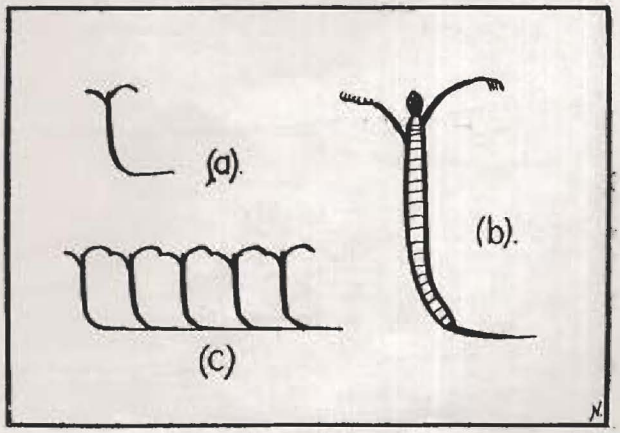


Fig. 31. Cross-sections of Barbs.

top and the bottom, so that the cross-section resembles the "I" beam section of engineering. Hence, here again, Nature is seen to make use of present-day methods of structural design. At (a), of Fig. 31, is shown the cross-section of one barb, taken from the Pheasant's feather of Fig. 29, as it appears to the human eye, the depth being, of course, the same as for the section "AA."

When held between the thumb and finger and rolled, or flattened, the appearance is not unlike that of an insect's wing. It is glossy and semi-transparent. Examined beneath the microscope, the barb section is seen to be hollow, or nearly so, for the main part, from the sides of which the two upper arms protrude, whilst the one lower arm forms a continuation of the main member. (See (b) of Fig. 31.) The centre, or core, consists of air cells and thus ensures lightness in even so minute a detail. At the end of each upper arm is a number of small hooks which engage to connect one barb to the next, as was anticipated earlier in this section.

The structure of barbs of the various feathers of a bird, and of the different species, varies to some extent and this subject forms a specialised study in itself. A good deal of research on this subject has been carried out by Mascha* and others. A number of photographic reproductions of microscopic specimens were given by Mascha, together with full descriptions, but, unfortunately, a great deal of value has been lost owing to the exact positions of the feather sections having been omitted, and the lack of differentiation between the various types of feather.

From what has been said it becomes apparent that a section through a number of barbs gives the configuration of (c), Fig. 31, and this shows clearly the manner in which the depth of aerofoil section is obtained. Again the cellular formation is employed.

On the underside of the feather of Fig. 29, each vane was seen to have a glossy surface over a certain portion of its area (left blank in the figure). This peculiarity was found to be caused by the smooth tail flanges of the barbs overlapping each other (see Fig. 31 (a) and (c)), and forming what appears to be a continuous film. This is also referred to by Mascha in the following paragraph: "Ahlborn (1896) describes a peculiarity of certain parts of the remiges (feathers). . . . He says that portions of the lower sides . . . seem to be covered by a fine membrane, this appearance being due to the fact that the (barbs) . . . . are connected by delicate membranous extension of their ventral margins, which bridge over the spaces between them. These extensions . . . exactly fit on the ventral margins of the barb in front, to which they adhere on account of their intrinsic elasticity."

Secondary Feathers.

The construction of secondary feathers is fairly similar to the primaries already described, except that there is no pronounced depth of section; there being no need for it in this case, since the secondaries form part only, chiefly the outer surface, of the main wing.

Secondaries are generally short feathers with good width of vane, and extend from the ulna of the forearm, to which they are rigidly attached, to the trailing-edge of the wing. Fig. 32 shows a secondary feather (fifth from root) of a Changeable Hawk Eagle, a soaring bird of Northern India, and a section at the position indicated. The singular shape of section is at once apparent and suggests some sort of "windmill" action, which has misled many investigators into making the false assumption that a rotary motion must take place. The true purpose is, however, quite different, and was discovered by adding further sections in positions corresponding to the disposition of the secondaries in an open wing. The result is shown in Fig. 32, from which two points emerge.

The suggested rotation is seen to be almost impossible, as each feather is held in position by its neighbours, but the arrangement clearly gives depth to the wing section as a whole, and this is evidently the correct solution to the peculiar double curvature. Most species of birds possess this feature to some extent, and thus, once more, aerodynamic efficiency has been obtained without sacrifice of extreme lightness. The quill section extends well below the vanes, but it is housed within the external surfaces, and therefore offers no obstruction to the air flow.

Secondary feathers derive some support from the upper and lower coverts, and advantage is taken of this for decreasing the shaft diameter over the innermost portion. In other words, the quill section is greatest at a point roughly one-third of the length from the root, where maximum strength is needed, from which point it tapers in both directions, and in this manner economy of material and weight is achieved.

Covert Feathers.

Little remains to be said concerning these feathers, but it is interesting to note that the top covert quills are noticeably larger than those underneath, due, no doubt, to the fact that transference of the flight loads from the secondaries is made to the upper coverts. As with the secondaries, so for the coverts also does the quill lie flush with the outer surface and project inwards.

The covert feathers play an important part in the formation of the wing shape, as well as acting as stiffeners to the main feathers.

*"The Structure of Wing Feathers," by Dr. E. Mascha, published in "Zeitschrift für wiesenschaftliche Zoologie," and reprinted in U.S.A. in "Smithsonian Miscellaneous Collections," Vol. 46, dated May 6th, 1905.

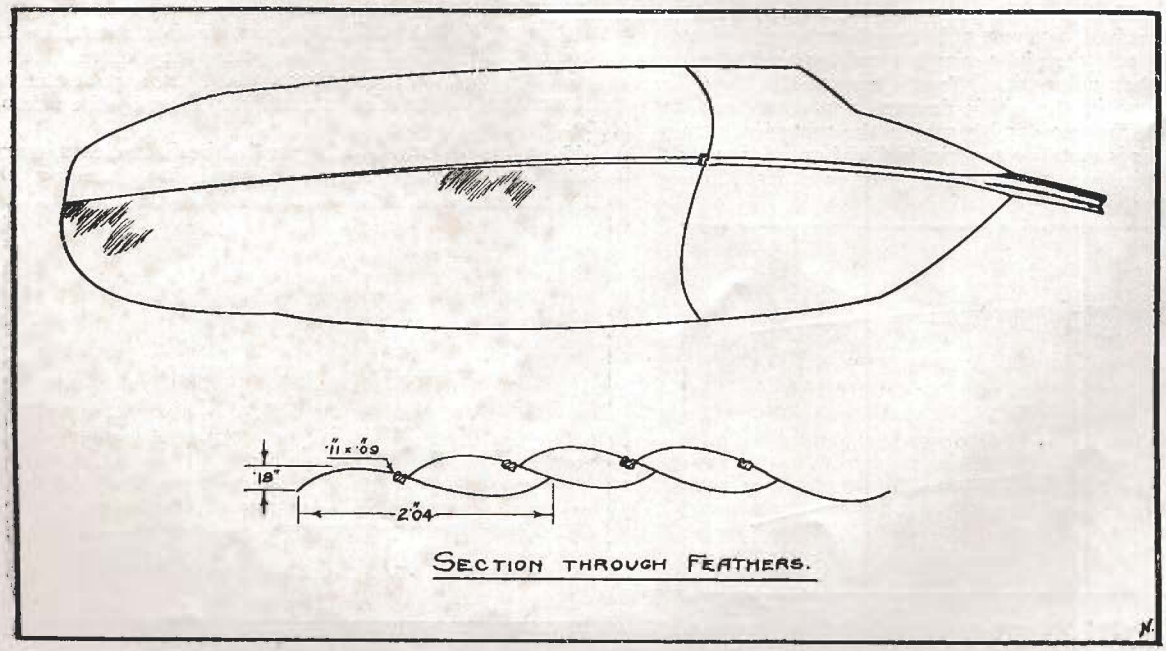


Fig. 32. Secondary Feather of Changeable Hawk Eagle.

GERMAN GLIDING SCHOOL REPORTS

THE R.R.G. SCHOOLS

[*The following is a translation, condensed in parts, of the report of the Rhön-Rossitten Gesellschaft upon the activities of its gliding schools during the year 1932.*]

During the seven months of the year in which training activities were carried on, both schools made further progress compared with the previous year, the Wasserkuppe registering an increase of 30 per cent. and Rossitten 20 per cent. in the number of pupils. Many pupils took two courses, either consecutively or with an interval between. This strong attendance is all the more gratifying in that many more gliding and soaring grounds are now in use in Germany than heretofore, and shows that the R.R.G. is working on the right lines in giving its pupils a thorough and many-sided training.

THE WASSERKUPPE SCHOOL.

Owing to special concentration on the training of advanced pupils, the number of "B" and "C" tests passed (136 and 126 respectively) was greater than that of the "A" certificates (109). In addition, 86 "Official C" certificates were obtained (for this test five soaring flights totalling half an hour are required). Many soaring pilots, who already had their certificates, came back again to practise cloud and distance flying, and among their flights was one of eight hours. Six soaring pilots fulfilled the conditions required for the high-performance badge, to earn which a pilot must make flights of 50 km. (31 miles) distance, 1,000 m. (3,300 ft.), climb above starting point, and five hours' duration. Those who took the course had the opportunity of flying different kinds of sailplanes and thus extending their flying skill.

The SUPERFALKE has been found especially suitable for cloud flights, and for soaring practice the improved FALKE enjoyed great popularity. The position of the pilot, which in these types is somewhat far back, gives good protection in the event of a crash.

The four aero-towed flying courses, which took place in Griesheim, near Darmstadt, except for one on the Wiesbaden aerodrome, aroused great interest, even among power pilots both in Germany and abroad. The FLAMINGO, belonging to the R.R.G. Research Institute, was used as the towing aeroplane, and sailplanes of FALKE and PROFESSOR type were flown by the pupils, of whom 61 in all took part in the courses.

The number of serious accidents during the year were very few; out of some 450 pupils only two were seriously injured. This is attributed in part to the care taken in instruction, and in part to various causes such as the removal of large boulders from the landing grounds, the positioning of the seat in the FALKE types, the recently-introduced crash helmet, and in the towed flying, the carrying of a parachute. In order to accustom the pupils to getting into involuntary flying attitudes, some pupils were taught spinning in a FALKE, but no other aerobatic manœuvres were practised.

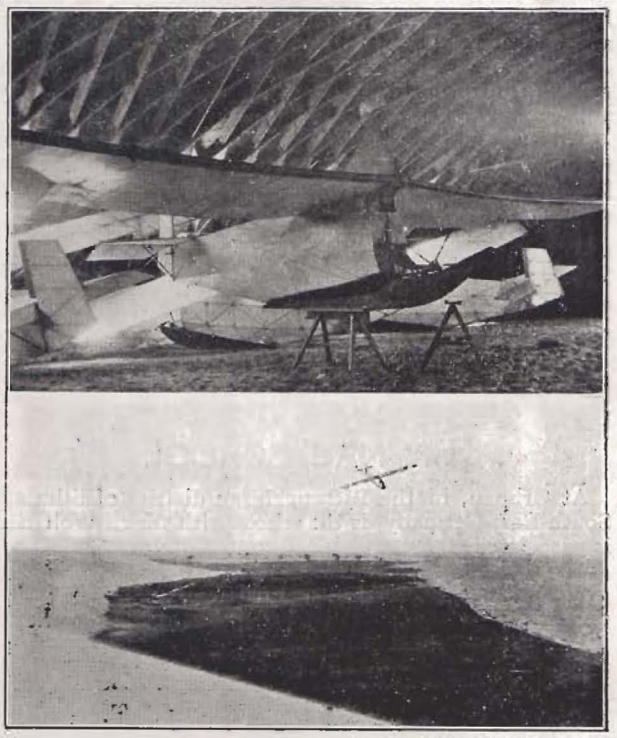
In addition to the three regular flying instructors, suitable pupils were at times given the work of instructing—a useful experience, since some of them were to become instructors on returning to their own clubs.

It had been hoped to introduce a winch for use when the wind was unsuitable for hand-launching, but the apparatus could not be got ready in time.

The school has been developing the HUMMEL II. with a view to using it for the transition from motorless to powered flight; the trials of this machine have proved satisfactory.

THE ROSSITTEN SCHOOL.

At the Rossitten School in East Prussia, work was continuous from April to the end of October, and the certificates obtained were 292 "A's," 198 "B's," 80 "C's," and



At Rossitten Gliding School. Above: "Zingo" type machines in the hangar. They are faired "Zöglings" with slightly larger wings. Below: A pupil taking his "C" on a "Zögling." Sand dunes to the left, lagoon on the right, meadow in centre.

28 "Official C's." The ZINGO type has been replaced by the "Arrowhead ZÖGLING," which has swept-back wings, while the ALEXANDER DER KLEINE type of sailplane is also used. Machanical launching has now been introduced, both by car and by winch. Also a MESSERSCHMITT M23B areoplane, belonging to the R.R.G., has been adapted for towing. These methods were used on the Vogelweise meadow, adjoining the school. The 36 pupils who took the towed flight courses were also familiarised with the use of blind-flying instruments, and an old PRÜFLING fuselage was turned into an "Everling revolving chamber" for introductory schooling.

Hand-launching took place on the sand dunes, either near the school or at Pillkoppen (6 miles to the north), according to the wind. In order to facilitate passing the soaring tests, and to enable bigger flights to be made, observation shelters have been set up on the dunes. "C" tests were frequently passed between 1 and 6 a.m. so as to make use of the most favourable winds. Some pupils flew in winds up to 25 m. per sec. (55 m.p.h.), which were then very gusty. Flights of five hours' duration were recorded, and one of eight hours, while a lady pupil set up a new record with a flight of 5 hours 6 mins. A few pupils were towed up behind the aeroplane and succeeded in making cloud, thunderstorm and distance flights, one of which finished in Lithuanian territory.

The school was staffed with eight instructors.

In addition to the "Arrowhead ZÖGLING," types fitted with an auxiliary engine are now being developed by the school. These are: a "motor ZÖGLING," a high-performance sailplane with pusher screw, and a tailless sailplane. They have, however, not yet been introduced into the schooling activities.

The charge for board in the R.R.G. Schools has been reduced, during the summer months, from R.M. 2.50 to R.M. 1.80, owing to the reduced financial circumstances of many of the pupils.

THIS YEAR'S COURSES.

The **Wasserkuppe** courses last four weeks. This year's courses for both beginners and advanced pupils start on May 29th, June 26th, August 28th and September 25th, and another advanced course begins on July 10th.

The aero-towed flying courses at **Griesheim**, near Darmstadt, also run by the Wasserkuppe School, last 10 days, and commence on May 22nd, June 19th and July 17th.

This year's courses at **Rossitten** correspond, as before, to the Calendar months, and continue to the end of October, both beginners and advanced pupils being catered for each month.

During each month, in addition, instruction can be given in winch-launching, auto- and aero-towing; also "C" pilots can join the school for further practice.

There are two special courses for towed flight behind a motor-boat, commencing on July 1st and August 30th.

As all these dates may be subject to alteration, we can accept no responsibility for their correctness.

GRUNAU SCHOOL

At Grunau, in the Riesengebirge district of Silesia, in South-East Germany, is the school with which Wolf Hirth is associated.

The figures of the school's achievements in 1932 are given below, the corresponding figures for 1931 being given in brackets for comparison.

The number of pupils was 516 (446), which included 19 women and 24 foreigners.

The tests passed were:—

"A" tests, 223 (244), of which 33 were obtained by an auto-towed start.

"B" tests, 262 (235), including 32 by auto-towing.

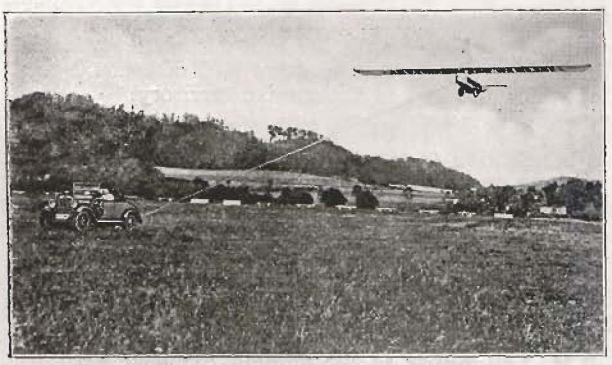
"C" tests, 162 (102); and "Official C" licenses, 72 (44).

The total number of launches was 13,720 (11,370), and total time in the air 348 hours (214 hours).

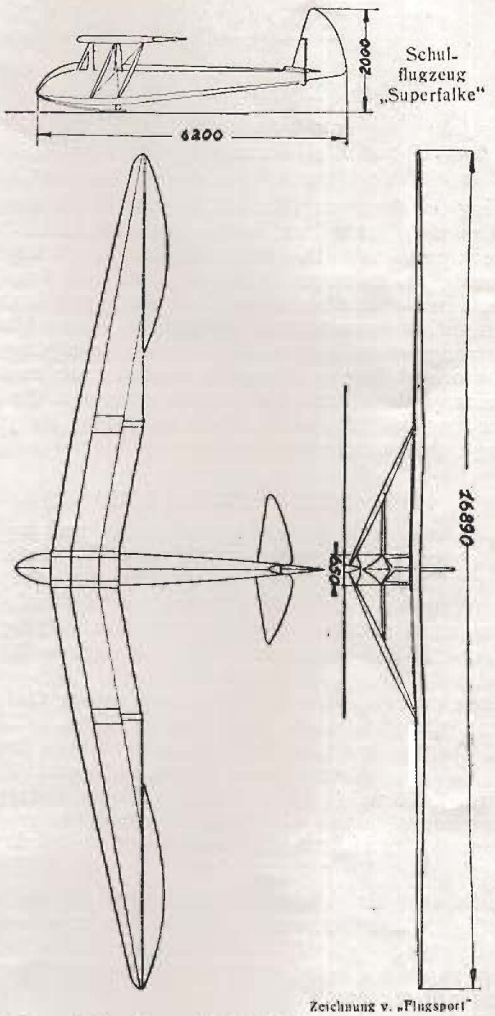
The school now possesses 25 gliders and sailplanes, made up as follows:—

Eight E.S.G., four R.S.G., three FALKES, one GRUNAU 9, two BABIES, one FERDINAND, one STANAVO; and for towing, two E.S.G., two FLIEGE type (open metal-tube fuselage, with nacelle), and one GRUNAU 8 two-seater.

The E.S.G. and R.S.G. types were illustrated in our issue of January 20th, page 9, and described on the same page in a letter from Mr. P. S. Foss. The E.S.G., a primary trainer, has an open fuselage, and the R.S.G., a secondary, an enclosed body, but the same wing is used for both. Mr. Foss, who flew these types at the Dörnberg School, near Cassel, described the E.S.G. as "almost uncrashable." Writing in reference to this letter, Wolf Hirth remarks: "Your readers may be interested to know that both gliders are of Grunau design. The E.S.G. has proved perhaps the best of the training machines. We have made with it here in Grunau, up to now, 30,000 take-offs without one fatal accident. As far as I know, only once a leg was broken. E.S.G. means Edmund Schneider, Grunau, who is the well-known manufacturer of sailplanes, and is best known perhaps by the small sailplane GRUNAU BABY, of which he delivered twenty-two machines last year. He also owns the design (i.e., sells the drawings) of the STANAVO, the performance sailplane used in my Grunau Soaring School. The E.S.G. drawings are sold by the school, which is not connected with Schneider, but works in friendly co-operation with him, which is shown by the fact that I myself helped a lot with the design of the STANAVO and the GRUNAU BABY. Another machine I designed for the school is the GRUNAU 8, a two-seater specially for auto- and aeroplane-towing."



Auto-towing instruction at Grunau.



The "Superfalke," used at the Wasserkuppe School for cloud-flying practice. It was described in our issue of February 17th, p. 31.

(Reproduced from "Flugsport.")

COURSES AT GRUNAU.

Instruction goes on from February 1st to November 21st this year. Seven different kinds of courses are held, and of these there are usually three or four going on at the same time. The types of courses are:—

A.—Beginners; duration, three weeks; object, "A" and "B" tests.

B.—For those with some previous training. Object, "B" and "C" tests.

C.—Advanced course (two weeks). Object, "C" test.

D.—Soaring practice for "C" pilots (two weeks). Object, "Official C" and high-performance flying.

E.—Auto-towing; for obtaining the "A" and "B" in only 1½ weeks.

F.—Combined auto-towing and soaring course for getting the "A," "B" and "C" in 3½ weeks.

G.—Workshop course (minimum, one week); can be taken any old time.

Instruction on theoretical matters is included in all the courses.

C. H. LOWE-WYLDE

C. H. Lowe-Wylde was born on February 4th, 1901, at Newcastle-on-Tyne.

His interest in aviation first took practical form at the age of 14, when he built his first glider in a cellar in Heaton Road, Newcastle. In 1917 he learned to fly.

He was apprenticed to Sir G. Armstrong-Whitworth and Co., Ltd. (Aviation Department), after which he spent two years in the Royal Air Force as technical instructor. He then became works planning engineer to the Blackburn Aeroplane and Motor Co. in Phaleron, Greece, and later, experimental production engineer in the Supermarine Aviation Works.

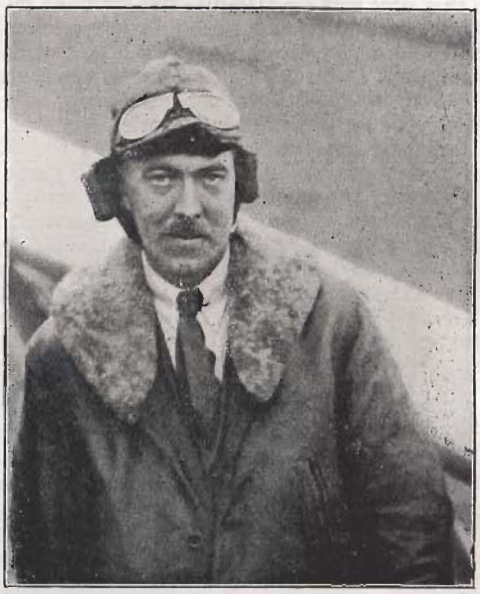
Mr. Lowe-Wylde had always been interested in motorless flying, and upon the resuscitation of British gliding at the end of 1929, he at once began to take an active interest in the movement. On January 4th, 1930, he formed the Kent Gliding Club. The club set to work under his leadership, and in five weeks produced the first primary training glider to be either built or flown in England. The first flight took place on February 23rd, in the presence of an enormous crowd of spectators.

Mr. Lowe-Wylde was the possessor of the first British gliding certificate ever issued, taking his "A" in March on the London Club's ground. Later in the year this certificate came in useful when he made an unexpected landing after soaring in the Maidstone district; the local policeman came up and asked him for his pilot's licence—probably the only instance on record of such a happening.

In the middle of June, 1930, he took part with several others in a tour to Frankfurt (for an international gliding conference), to the Rhön, and to the glider works at Cassel. The sight of three crashes in one day on the Wasserkuppe convinced him that for primary training a club, to be successful, must have good resources. In fact, wherever he went, Mr. Lowe-Wylde was on the look-out for the lessons to be learned from the successes or failures, as the case may be, of the clubs he visited. When one looks for the consistent aim of all the work that he did, it is to be found in his desire to get the greatest possible number of people into the air—to make flying available for all who wished to fly, whatever their circumstances. He made a special study of the causes which led to the failure of so many clubs to maintain the interest and activity of their members. One of the principal faults, he asserted, was lack of business ability in those at the head, who were generally chosen haphazard owing to their not having previously known each other. He also found (this was at the end of 1930) that too many clubs were getting to look upon primary training as the sole end and object of their activities, rather than as a means to the further end of soaring flight.

In 1930 he founded the British Aircraft Company at Maidstone, and started on the production of the well-known B.A.C. series of gliders, numbers of which are now in use all over the country. Of these, the B.A.C. I. was the original Kent Club machine. The B.A.C. II. was evolved, about September, 1930, after studying the needs of the clubs, as the most suitable type of primary trainer; it has struts instead of wires, and a box spar fuselage replaces the usual open one. B.A.C. III. is a secondary trainer, using the same wings and tail but having a proper fuselage. Kronfeld flew one at Ditchling in October, 1930. B.A.C. IV. has different wings, of better shape, and is designed as an intermediate sailplane.

At the beginning of 1931, Lowe-Wylde launched out on a new line, and introduced auto-towing. He has been looked on, both in this country and abroad, as a pioneer in this work; not because he was the first to auto-tow, but because he evolved a safe and reliable method for the teaching of *ab initio* pupils and demonstrated its usefulness to the doubters. The method was introduced to the public at Hanworth on January 11th, 1931, after some



weeks of experiment in comparative secrecy. One of these experimental flights is of historic interest; Mr. Lowe-Wylde got up high enough to keep in the air for 68 seconds, enabling him to do a complete circuit and land back at the starting-point. Of a sudden it came to him that here was the ideal training method for which he had been looking. It only remained to lengthen the cable, instal a winch for paying it out while the glider was climbing, and the new method was ready for public demonstration. After Hanworth, the team visited various N.F.S. aerodromes in the provinces to show off the new method.

On March 4th, 1931, the B.A.C. was registered as a private company with Mr. Lowe-Wylde and Mr. and Mrs. Green as directors. Three new types of glider were designed specially for auto-towing and put on the market; the B.A.C. V. for primary work, the VI. as a sailplane, and the VII. as a two-seater, the last two with the same wings and tail unit as the B.A.C. IV.

A B.A.C. VI. was soared by Wolf Hirth at Balsdean on April 1st for 2 hours 13 minutes, this being a record for a British machine. After he landed, Lowe-Wylde went up and qualified for his "C" certificate, but the machine did not yet possess its C. of A. About this time, the B.A.C. introduced regular courses of instruction in auto-towing. On Easter Monday an auto-towing demonstration was given at Brooklands during the race meeting. On one of the last flights, after starting from Vickers' end of the finishing straight and then circling over the spectators' hill, Lowe-Wylde dived down under the footbridge which crosses the straight. Unfortunately a man persisted in standing in the way, and, in an attempt to avoid him, one wing-tip got knocked off against the bridge. The damage, however, was not enough to prevent two more flights being made with the same machine.

During 1931 Lowe-Wylde toured the country with one or two assistants and a B.A.C. VII. two-seater, Mrs. Green being in charge of the towing car. Large numbers of the public were taken up as passengers. During a visit to Dunstable Downs, he went up solo and soared for 1 hour 31 minutes, his longest soaring flight.

An adaptation of this machine for towing over water, the B.A.C. VIII. or BAT BOAT, was built in June. It was tried out at the Welsh Harp later in the year (December 7th), when 12 flights were made, towed behind a speed boat.

In June also, Lowe-Wylde was one of the four entrants for the *Daily Mail* cross-Channel gliding prize, which was, however, won by Kronfeld in the WIEN.

On August 23rd, he tried to cross the Firth of Forth in a B.A.C. VII. The attempt was repeated on September 6th, and this time was successful. The machine was towed up to 4,000 feet behind a MOTH. As the release on the glider failed to work, the cable was released at the other end instead, and Lowe-Wylde flew across the Firth, soaring part of the way, with the cable dangling below.

The next product of the B.A.C. works, the B.A.C. IX., made a dramatic appearance at the end of the Balsdean meeting in September. After 12 days and three nights of feverish work, the machine was just got ready in time; Lowe-Wylde, after a preliminary announcement on the loud-speaker, stepped into it, was launched, and disappeared into the mist. This machine was another example of the care with which its designer studied the needs of clubs; he decided that, since the heaviest item in the cost of producing a machine is labour, the demand for cheapness could best be met by eliminating this factor and selling the parts only, these being designed for the simplest possible manner of assembly.

Early in 1932, preparations were made for the forthcoming tour with Sir Alan Cobham's "Circus." The B.A.C. VII. Mk. II. was developed, in which ease of dismantling at the end of the day's work was the chief consideration. This tour occupied most of Lowe-Wylde's energies, apart from an interruption in June, when three machines of the new type were towed behind MOTHS at the R.A.F. display.

Then, in the autumn, the first trials were made with a power-driven machine. Two B.A.C. VII.'s were fitted with Douglas motor-cycle engines perched on a metal tube structure above the wing, and were publicly demonstrated at Hanworth. In a letter to THE SAILPLANE of November 25th, Lowe-Wylde gave the reasons which induced him to undertake this new departure. He was convinced that only a minority of those attracted to gliding had the desire of becoming "soaring aces"; most of them merely wanted cheap flying, and this the new method would give them more effectively even than auto-towing.

The lessons learned by this new experiment were embodied in the DRONE, which was first shown in public on March 9th this year. The engine was lowered somewhat, drove a pusher airscrew, and was placed upon a wooden "neck" which, in a later modification, contained the petrol tank.

Though the low-powered aeroplane, if it is developed, is bound to take away a certain proportion of recruits from motorless flying, there is nevertheless a pressing need for such a machine, and it is earnestly to be hoped that Mr. Lowe-Wylde's work, which has been so tragically cut short, will be continued by others, so that his efforts will not have been in vain. The greatest danger to the development of the really light aeroplane is undoubtedly the tendency to put more and more powerful engines into it, until at last we are back again where we started from—the so-called "light" aeroplane that is no light aeroplane at all. And this tendency, so far as one can see, can only be combated by the development of the sailplaner's outlook—the wish to fly for the pure joy of being in the air, rather than merely to get about faster and more noisily than one's fellows. To that extent, then, at least, the devotees of the sailplane and of the light aeroplane are bound by a common interest. But, whatever the future holds in store, Mr. Lowe-Wylde's name is never likely to be forgotten.

A. E. S.

CORRESPONDENCE

THE HUISH MEETING.

Sir,

In view of the fact that the first crop of grass is to be cut and gathered during the first fortnight in June, the owners of the land have suggested that it would be more convenient and advantageous to all concerned if we commenced our Meeting in the middle of June and not the beginning. This would not only provide more fields to land on, but less damage would be done to crops.

Under the circumstances it has been decided to postpone the start of the Meeting to June 15th, the period now being June 15th to July 16th inclusive.

Suitable facilities will be available for clubs and others to carry out training. Passenger-carrying machines are being provided and the work of instruction will be carried out by a qualified instructor throughout the period.

Clubs are invited to bring their own machines. A ground fee of 5s. per pilot per week will be charged. Where instruction is given by the B.G.A. instructor, a fee of £1 5s. per pilot per week will be charged. It has already been pointed out that Huish Hill is excellent for soaring, so that "A" pilots will have no difficulty in getting their "B" certificates, and "B" pilots will have no difficulty in getting their "C" certificates.

I want to know as soon as possible, therefore, (a) which clubs will be joining the meeting as a whole, (b) number of individual members of clubs to be present, and (c) private owners who intend bringing their machines.

J. L. WAPLINGTON,
Secretary, British Gliding Association.

THE "SCUD" THAT IS NO "SCUD."

Sir,

With reference to the letter by Mr. Abbott in the last issue of THE SAILPLANE, I hasten to apologise on behalf of this Club, for the anxiety caused by the use of the term "Scud type machine."

I should, however, like to point out that regular readers of THE SAILPLANE will have noticed in earlier issues details of the make and manufacture of the machine, which clear Messrs. Abbott, Ltd., of any connection with it.

The machine, which was not constructed in this Club, was designed and built by aircraft men, and, up to date, has proved thoroughly airworthy and efficient.

Regarding the crash referred to by Mr. Abbott, this was not the result of faulty design, but of bad pilotage, and it is incorrect to refer to "shortcomings the machine has already experienced."

We will in future refrain from using the term "Scud type," although we consider the addition of the word "type" makes it clear that it is not a Scud machine.

For The Newcastle Gliding Club,
ALFRED P. MILLER,
Hon. Secretary.

MR. NYBORG'S CRITICISMS.

Sir,

Your comments on my letter published in the issue of March 17th appears to indicate that I have not specified my grounds of complaint sufficiently clearly.

The sentence to which you refer was, I think, relatively unimportant, and my objections were based on the following points:—

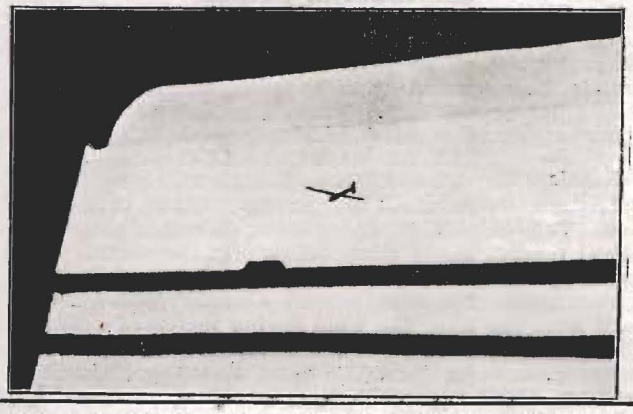
In the issue of July 8th, 1932, I put forward performance curves for the vulture, calculated both by "Kentigern" theory and by my own theory, intending to demonstrate the essential differences in the two methods, but, without further referring to me, this article was publishe dunder the title "A Comparison of the Performance of a Vulture and of a 'Tern' Sailplane," which, you will agree, somewhat detracted from the intention.

In the issue of January 20th, 1933, I gave the calculated performance curve for my glider, and this was accompanied by a photograph and a diagram showing the path of the particular flight referred to, but neither were printed. While the photograph was not exactly clear, the diagram was specially prepared for reproduction, and an editorial reference to the photograph would have helped to prove the agreement between the theory and the practical results.

It seems unfortunate that the editor of the official organ of an association whose main object is to promote the development of new ideas in motorless flying should consider the artistic value of a photograph before its technical importance, and I consider such an attitude hardly encouraging to anyone putting forward new ideas.

T. G. NYBORG.

NEWS FROM THE CLUBS.



Robertson soaring the "Professor," photographed from inside the Whipsnade 'bus.

FURNESS GLIDING CLUB.

April 22nd.—A number of short flights were made in the B.A.C. II. Breeze light and variable, finally setting in from the north-east.

April 23rd.—Wind again light and variable. Armer, a new member, was given his first slide and hops, and training flights were indulged in until once again the wind got to north-east.

May 6th.—The B.A.C. II. was rigged and got into position for a S.E. breeze. However, a heavy blackness from the south suddenly made up its mind and approached at great speed and of obvious intent. We had hardly time to secure the machine before the "front" reached us. We dutifully observed the phases associated with thunderstorms as we crouched under the wings and watched the water spouting from them. One member flew to Whitehaven, while two others branched off to Keswick and Carlisle respectively. We then drained the wings and hung the machine up to dry.

April 7th.—Wind light and variable. B.A.C. II. rigged and ready. Flying barely commenced when the remains of yesterday's storm decided to return. A hasty pack-up just beat it!

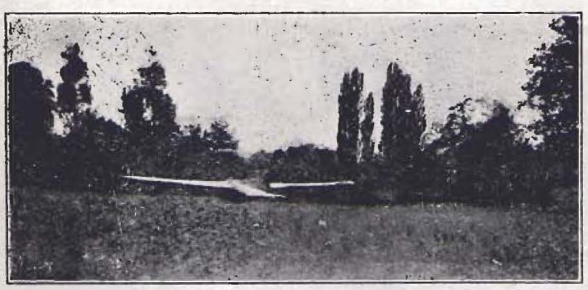
April 9th.—Red type, please! [We don't stock it.—ED.] *At last we have done it!* Soaring conditions arrived today. The DAGLING was rigged, and Stevens launched in a 12—15 m.p.h. wind, straight up the breast at Ireleth. He soared for 15 minutes, and although not gaining much height he made a very creditable "C" and landed at a point level with the take-off.

This is our first "C," and we are very proud of it. The club membership is entirely *ab initio*, and we have never had an instructor with any experience, either of power flying or soaring. We feel that it is possibly unique in this country.

May 11th.—Another soaring breeze! Once more great activity, but, by the time the machine was ready the breeze was dying somewhat. Stevens landed below after five minutes.

May 12th.—The conditions were as on the previous evening. The breeze died away gently, so Redshaw had a short flight on the top.

May 13th.—Light breeze from west. B.A.C. II. rigged.



Photograph and diagram of a flight by the Nyburg Sailplane on August 13th, 1932.

The weather then recognised the machine and we dismantled in the rain.

May 14th.—Started dead calm. Attempts to get Armer off for hops on the flat failed. Even the lightest member couldn't be hopped. A breeze then set in fitfully from the west, and short flights were made until lunch-time.

By the end of lunch a glorious breeze was blowing straight up the hill. DAGLING was rigged. The conditions were really wonderful. Breeze on the ground 15 m.p.h. Bright sun, fat little cumulus clouds forming everywhere! How we wished our friends with the CRESTED WREN were here, or Buxton with his SCUD!

However, Britton was launched to attempt his "C." He rose to prodigious heights—500 ft. was a cautious estimate—and seemed rock steady and perfectly happy. After a quarter of an hour he decided to land, and came in in great style. Unfortunately a slight bulge caught him unawares, the machine "ballooned" and blew over, damaging a wing. Redshaw, whose turn should have been next, became incoherent. We are putting out an S O S. He may be wandering, suffering from loss of memory.

After tea, when the wind died down, Redshaw was coaxed back to the site and given a couple of flights in the B.A.C. While his eyes still hold a glassy look, we have hopes of his ultimate recovery. A spell of "cramps and glue" is now indicated.

We are holding a week-end camp at Whitsuntide and hope to use either of our sites at Ireleth or Bootle Fell. We extend a cordial invitation to any club or individual who would like to join us. Please write the Secretary: H S. Gross, 106, Greengate Street, Barrow-in-Furness.

LONDON GLIDING CLUB.

On Sunday, May 7th, a soaring wind blew up the hill. The POPPENHAUSEN was hard at it all day, taking passengers. Among the latter were the Secretary of the B.G.A. and Mrs. Waplington, who spent the day on the club grounds. Hiscox and Collins did most of the passenger-carrying.

Among many soaring flights on various machines, Hedges had his first experience of flying the CRESTED WREN.

The new booted DAGLING (the boot is new, not the DAGLING) was taken off the top repeatedly all day long by various pilots, and occasionally just managed to soar. Eisenstädter made several attempts to get his "C" on it, starting off each time with a hair-raising zoom from the launching point.

STRATHEARN GLIDING CLUB.

On May 5th, according to the *Perthshire Advertiser*, the annual general meeting of the Strathearn Gliding Club was held in the Strathearn Institute. Mr. John Laidlaw, captain of the club, presided in the absence of Captain James MacRosty, president. Reports submitted by the secretary, Mr. Q. M'C. Craig, and the treasurer, Mr. T. J. Donaldson, were satisfactory and approved. The treasurer's report showed the income for the year to be £69, which included garden fête, £37; gliding demonstration, £4 4s., and subscriptions, £18 18s. The expenditure amounted to £38, and there was a credit balance of over £30. Mr. Laidlaw, in reviewing the flying meetings and work of the club in general, said that 256 flights had been made and twenty flying meetings had been held.

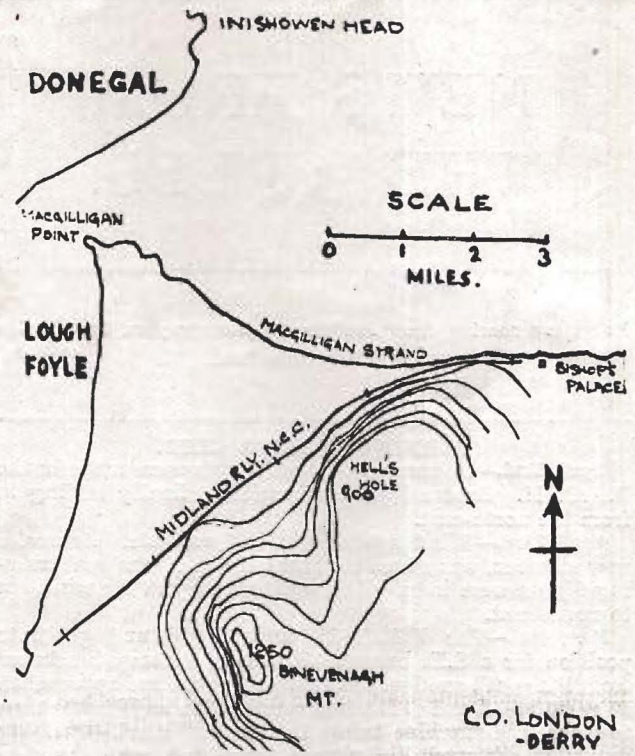
MANCHESTER DOINGS.

The Gliding Section of the Manchester branch of the Royal Aeronautical Society possess three gliders of different types. They propose going into camp at Whitsuntide, accompanied by their instructor, Mr. B. A. G. Meads, for several days. Three sites for the camp are under consideration, but a decision has not yet been made.

ULSTER GLIDING CLUB.

Saturday, May 6th.—Machine, KASSEL 20. Site, Knockagh, above Greenisland, Co. Antrim. Wind, S.E.; force 4—5. Total flights, 2; flying time, 45 mins.; maximum height reached above start, 750 ft. On the second flight Baster was smitten by a hailstorm and retired in haste from a rather one-sided battle by landing about a mile back from the face, the wind having increased considerably. Passing high enough above the area of down-currents not to be affected by them, he made an excellent landing, albeit somewhat near to a herd of cows, but without damage to KASSEL or cattle.

Sunday, May 14th.—Machine, KASSEL 20. Site, Magilligan Strand, Co. Londonderry. Total flights, 12; flying time, 4 hours. Wind, 6—12 m.p.h., variable N.W.-N.N.W All flights were started by auto-towing along the sand in a westerly direction to about 600 ft. height, using a 1,000 ft. wire rope. Five pilots were flying in turn, and though the wind was too light on the first round for anyone except Mrs. Mackie to soar, everyone made height on their second flight, Mackie, Mrs. Mackie and Baster obtaining 1,350, 1,500 and 1,200 feet respectively, over the portion of the ridge known as Hell's Hole. The wind dropped off slightly later, but Wynne, after gaining 1,100 feet over Hell's Hole, crossed the valley to Binevenagh Mountain, arriving there at 950 feet (above sea level). In two beats over the face he soared to 1,650 feet; then returned along the ridge to the eastern end of the sand and landed at start point. Total length along line of flight (excluding beats) between extremes at each end—8 miles.



Both height and distance could, of course, be greatly improved on with a good breeze. Clouds were forming over Donegal on the west side of Lough Foyle, and by the time they reached the ridge were not lower than 2,500 feet.

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