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COMMUNICATIONS BY AIR IN THE EAST

A MEETING of the Central Asian Society was held at 74, Grosvenor Street, London, W. 1, on Thursday, January 20, 1921, when Captain P. D. Acland read a paper on "Communications in the East: Their Expansion by Means of Aircraft." Lord Carnock presided.

The CHAIRMAN, in opening the proceedings, said: Ladies and Gentlemen,—It is my pleasing duty to introduce to you Captain Acland, who has been good enough to come here this afternoon to read us a paper on "Communications in the East: Their Expansion by Means of Aircraft." Captain Acland is a well-known authority on the subject with which he proposes to deal, so I think we can look forward confidently to hearing a very interesting and instructive lecture.

Captain ACLAND: My Lord, Ladies and Gentlemen,—I had to recast this lecture at the last moment, because I found that Lord Montagu of Beaulieu was giving a lecture from a commercial point of view, so I took the liberty of cutting out any figures I had put in in order to avoid any confusion. We get very confused when we start talking about figures, because most of us take very different angles, and you don't get very much farther. You will have an opportunity of seeing what Lord Montagu had to say on the subject of figures to-morrow, from which you will be able to draw conclusions.

I should like to say how honoured I feel at being asked to give this lecture to-day before so august a Society and so well-known a gathering. I feel that the time is at hand when the advent of aviation is very close to us—indeed, everything points to this fact. If we look back over the last hundred years, we find that progress in communication, advancing year by year, has been leading up to the stage when a man must needs have himself transferred, body and soul, to the place he desires. We have gone forward step by step from the written message sent by cable or wireless telegraphy to wireless telephony, by which means the voice can be carried for vast distances; all these, however, are only subterfuges in really urgent and vital affairs of State, or business, or war, where the presence of perhaps one man decides the day. We all know how much personality counts—States are ruled by it, businesses are run by it, the war was won by it. The transference of a man's personality may mean a decision that will turn a seeming defeat into a victory; he may be the means

of stopping a revolution, or perhaps turning what seems a trivial affair into a sanguinary civil war. Thousands of such cases could be produced, all proving the same thing—namely, that the fact of being able to arrange for the presence of a certain man or men at a certain place on a certain day is the consummation of human need. And apart from the individual, it will mean that close linking up of nations we all long for, leading to better relationship, harmony, and peace.

The development of aerial transport signifies all this. Before long we shall be able to say with certainty to America, "We shall be with you to-morrow"; to India and South Africa, "The day after to-morrow"; to Australia, "In five days." The uttermost ends of the earth will be as near to us then as Egypt is to-day.

The progress of the world depends upon the advancement of aircraft.

In drawing up this paper to present to you I was faced with a difficulty as to what method would be most likely to lead to a discussion, which, to my mind, is the chief value of meetings of this description, where there is such a wealth of experience and talent represented. It occurred to me, therefore, that by setting out certain facts showing what has been done up to the present, and by indicating a few conclusions based upon experience, an opportunity would be given for those who have specialized in certain aspects of Government service, and aviation, to base their views on what they have heard and express an opinion as to how they consider their duties in the past, and the duties of those of to-day and in the future, would be facilitated by making the fullest use of this new means of transport and human intercourse.

Perhaps it will not be considered out of place if some consideration is given to the stages of development of our science up to the present time.

PROGRESS.

The very rapid advance made in aviation was due to the necessities of the war, together with a complete disregard of expense so long as definite results in the direction of obtaining aerial supremacy over the common enemy in all phases of aerial warfare were attained. For instance, at the commencement of operations in 1914 the majority of aeroplanes were fitted with power units of 70 h.p., with quite a number of 63 h.p., whereas the Germans had successfully attained 100 h.p. These conditions obtained for the first few months of the war. In November, 1918, however, a few British machines were operating with 150 h.p. motors, a very large number of single-seater machines with 200 h.p., heavy bombing machines with 700 h.p., while in England a type was being evolved and tested of 1,400 h.p.,

and yet another of approximately 5,000 h.p. being "drawn out." It seems almost miraculous that this evolution could be brought about in so short a time.

WAR TO PEACE.

It has been one of the constructors' great difficulties since the war—and I may add disappointments—that they have not been able, for economic reasons, to continue their experiments and research on a similar scale. However, a vast mass of most valuable data was collected which gave us the means of studying departures in design which might fulfil commercial conditions. You will, I am sure, excuse me mentioning machines designed and produced by ourselves, but it is simpler for me to illustrate the Vickers-Vimy, which is a good example of one of the methods adopted for rapid turn-over to peace conditions. The war machine had a capacity of about 100 cubic feet, whereas our adaptation of this machine for commercial purposes—such as *The Times* aeroplane which flew from London to Tabora, and that named the "City of London," operated by Messrs. Instone and Co. between London and Paris—has a capacity of 300 cubic feet or sixteen passengers, the actual load in pounds to be carried remaining the same (approximately $1\frac{1}{4}$ tons dead weight).

The war types can be generally classified as follows:

(a) *Single-seater* machines for scouting and offensive work, which have their prototype in civil life in sporting machines;

(b) *Two-seater* machines used for reconnaissance and artillery spotting, and in their heavier forms for day-bombing; and

(c) *Heavy bombing* machines, of which the Vickers-Vimy, Gotha, etc., are examples.

For the change-over to peace the machines on which designers chiefly centred were—

(a) Single-engined reconnaissance, and

(b) Twin-engined heavy bombing types,

the reason for this being that there was more scope with these of effecting modifications to existing machines, as opposed to building and testing a completely new design, to enable a commercial load to be carried in anything like attractive quantities, time being an all-important factor. Good examples of the single-engined type were the Bristol two-seater fighter, converted to the Bristol tourer, and the evolution and new design of the D.H.4 and D.H.9, from which was eventually evolved the D.H.16 and later the D.H.18; and, finally, in the twin-engined heavy bombing type, the Vickers-Vimy bomber, from which was evolved the Vimy commercial.

I propose leaving this aspect here with the sole remark that out of war types craft have been evolved which are doing very good work

in service, but at the same time sufficient data have not been collected to make it possible for a really practical specification to be got out as to what is ultimately needed. We cannot expect in these, the early days, to be able to make exact statements of what is required in the same way as engineers of a railway or controllers of shipping interests can issue specifications of material to be used by them in their operations.

CIVIL USES.

Since the Armistice, and particularly during the last nine months, aircraft have been operating to a considerable extent in various parts of Europe. The technical results of all of these services have shown more than promising regularity and freedom from serious accidents, as is shown below:

Period, May, 1919, to September, 1920 (17 Months).

Flying accidents resulting in death to one or more occupants of machine ...	7
Flying accidents not involving injury to personnel	19
Third party killed ...	1
Third party injured (propeller accident) ...	1
Machine miles per flying accident (not necessarily fatal) ...	31,400
Passengers killed per 1,000 carried, or 1 in 12,500 ...	0.08

Period, October, 1919, to September, 1920 (12 Months).

(These figures include Continental Services.)

Total number of machine flights made ...	27,229
Total number of passengers carried ...	42,153
Total weight of goods carried ...	112 tons
Total number of miles flown ...	921,174

I particularly want to draw attention to the last half-yearly results which have been published in Germany, and were also issued in the half-yearly report of the Controller-General of Civil Aviation published in December last. These results are all the more remarkable as they show very great determination on the part of the Germans to compete seriously, and to entertain the running of aerial transport services. At the same time one cannot refrain from respecting the initiative shown when one considers the very great restrictions which were placed upon them in all matters connected with the air.

In spite of the restrictions imposed by the Peace Treaty and petrol shortage, the results achieved by Germany in the first six months of commercial aviation are approximately 50 per cent. of those achieved by the British. Over a third of a million miles were flown, 1,574 passengers carried, and over 81 tons of mails, parcels, etc., carried,

while the regularity of scheduled flights shows an efficiency of 93·3. Six new designs have been passed as "civil" by the Inter-Allied Commission of Control; permission for manufacture, however, has not been granted so far. The trading companies have formed an association which is officially recognized, and now appears to have assumed responsibility for the control of aerodromes, meteorological stations, and signals. There are daily services connecting Berlin and Copenhagen, Berlin and Bremen, Berlin and Wangerrooge, and three times weekly from Berlin to Amsterdam.

It is of considerable interest that the trading Aerial Transport Companies have associated themselves with the Hamburg-Amerika Line and the Norddeutscher Lloyd.

Representatives of the German industry are investigating the opportunities for exploiting German machines in North and South America, especially the former, with a view to inaugurating a Transatlantic Airship Service.

This should serve as a warning that the potentialities of the air are not being lost sight of by the Germans—a fact which I urge should be pondered on most particularly in reference to some of our long and sparsely defended frontiers in distant lands.

SUBSIDIES.

You will doubtless have made a mental note that I have said nothing up to the present on the finance of aerial traffic.

The story of aerial transport has been somewhat disappointing to date. We have seen that several enterprising concerns have ceased operations altogether, while others are carrying on with restricted services. This state of affairs is not surprising when one recalls that the services were experimental, the conditions under which they were working extremely difficult, financially as well as physically, the flying taking place over one of the most difficult aerial routes in the world—namely, a circle of about 250 miles radius of London—whilst in the early stages of organization. Almost every day this organization is being improved by the extension of wireless installations, aerial lighthouses, creating machinery to speed up the notification of meteorological conditions, etc., but this all takes time and, incidentally, spells expense. Again, firms directly interested in the construction of aircraft were the first to undertake transport, and, at a time when finance was necessary to nurse their new development, they were working under grave difficulties in that their whole business was disorganized through the cancellation of Government contracts and turning over their factories from war to peace, which is, of course, a difficult and embarrassing operation. The travelling public, on the other hand, had not developed the "air sense," and were naturally awaiting signs of a large volume of regular traffic before they were

prepared to trust themselves and their goods to this new, rapid, and little known means of transport.

You may have noticed in a letter to *The Times* of last Tuesday from Major-General Brancker, that reference was made to the report that Fokker machines are to be used in a London-Berlin service. Unfortunately, the British firm who made the preliminary negotiations for this service has now gone into liquidation, leaving the field open to Mr. Fokker, a Dutch designer of acknowledged achievement. It remains to be seen whether such conditions will receive official sanction.

We have just heard that Sir Frederick Sykes has at last been able to overcome one of his many cardinal difficulties in the shape of obtaining a subsidy for aircraft on approved routes, subject to final sanction. This is a matter for very sincere congratulation. I fancy it has not been the easiest project he has seen through. The effect of this should be good. One of the great dangers, as I saw it, was that owing to insufficient data financial and transportation interests were unable to see their way sufficiently clear to embark on something entirely new at this difficult time, the result being that the aircraft industry, from which the machines emanate, stood in danger of having no outlet for their new designs and sale of products, thus losing some of their best brains. This danger, I hope, is now past.

NOTES ON CAIRO-KARACHI ROUTE.

I now venture to approach the territory in which this Society is interested, and suggest that we keep in mind the aerial junction at Cairo with a view of linking up with Karachi, Damascus, etc.

First of all I want to say that my personal experience of transportation in the East has been that of an ordinary member of an Indian cavalry regiment. I am hoping that the proposed route will form a useful basis of discussion from several aspects. We want to benefit by the experience and advice of the distinguished members of this Society to aid us in promoting our art in this territory—for it is always the man on the spot, and the practical man, whose views are essential when endeavouring to urge forward the latest development of our Western civilization in the new territory.

Sir Frederick Skyes in February last, in speaking before the Royal Geographical Society on Imperial Air Routes, described Egypt as the hub of aviation in general and Great Britain in particular. I think the slide now to be shown makes this quite clear.

London to Cairo, of course, is not "all red" as we see it; on the other hand, it is a suitable and obvious first stop for an airship radiating from our capital in an easterly direction.

Here I think it is advisable to make myself very clear on the

method of setting out an Empire aerial organization based on Cairo. We require airships, aeroplanes, amphibians, and—though open to discussion—flying-boats as our full complement of craft, each to be used in its own sphere. Thus the airship, as we all know, is distinguished for its non-stop passages of 2,000 to 3,000 miles. A demonstration service is now being worked out by Sir Frederick Sykes.

Surplus airships left over from the war are to be operated by the Department of Civil Aviation, whose object is to experiment with them in practical service on a commercial basis, an undertaking impossible for private enterprise at the present time.

The part to be played by the heavier-than-air craft—that is to say, the aeroplane, amphibian, or flying-boat—is to link up points not touched by the airship, and to operate the shorter distances from the airship stopping-places—for example, aeroplanes from Cairo to Basra, say, thereafter transferring to seacraft until Karachi is reached. Up to the present time the prevalent view is that for heavier-than-air craft distances approximating 250 to 300 miles in one flight are economical for general purposes.

To operate from Cairo and to maintain a civilian aerial organization seems to me to be something which is of direct benefit to our great Empire.

The political conditions in Egypt and the awakening of national thought there seem to point to a progressive aerial policy, with as little militarism as possible in its elements—that is to say, intercommunication having to be kept free and open under all circumstances, considered decisions can be given in the shortest time on accurate information obtained from men on the spot. This can be done most easily by personal intercourse and exchange of views. Again, if the part replacement of troops by aircraft for security can be safely achieved, this will be of definite service, an outstanding example of this being the operations against the Mad Mullah a short time ago.

The present convulsions and disturbances in the Near East have retarded progress very considerably in laying out a Cairo-Karachi route, which perhaps is not altogether to be deplored, since the resultant economy in the working of the Department of Civil Aviation has made it possible for a sum to be set aside for the commercial enterprises nearer home, whereas the R.A.F. in the Near East have been doing all that is possible to extend their sphere of usefulness and obtain experience of flying conditions which in due course will be made available for their friends in commerce. But even so, generally speaking, wireless stations have been opened every 300 miles between Cairo and Karachi. This is a first step, and a vital one; without a complete wireless organization aerial transport is gravely handicapped, for by early and accurate notification of meteorological conditions a

regular service can be maintained. I go so far as to say that if wireless is necessary for shipping it is a hundred times more so for aircraft.

Doubtless there will be some delightfully intricate problems to be solved by our friends at the Air Ministry and Foreign Office in making suitable arrangements for aerial intercourse over the many and varied territories, mandatory and otherwise, which one now finds on the map in the Middle East. These will take time and patience to solve, and until the situation is clear politically there can be no question of private enterprise stepping in to organize and exploit this route.

METEOROLOGICAL CONDITIONS.

I am indebted to the Air Ministry for the following notes of the meteorological conditions existent on the Cairo-Karachi route, and I think you will agree that the pilots who contribute so largely in maintaining an average of 85 per cent. efficiency on the English-Continental services, notorious for the rapid variations in weather conditions, would have little difficulty in negotiating the average weather encountered in Egypt, Persia, and Mesopotamia.

The weather conditions in Northern Egypt are very stable. During the winter (November to February) cloudy weather with occasional rain prevails, the wind being usually south-west. March and April are the transition months to the summer season, and are usually very hot, with dusty south winds. From May to September there is a prevailing north wind, increasing to a fresh or moderate breeze in the afternoon, and falling by the evening. October is the transition month to winter conditions.

Over the portion of the route between Lower Egypt and the Persian Gulf, via Syria, Palestine, and Mesopotamia, the prevailing winds to a considerable height are westerly, and gales are rare, except at the equinox. The greater part of this area is arid and almost rainless, though subject to thunderstorms; hot winds of a sirocco type occur. The mean cloudiness is small; the coastal region of Syria is, however, subject in midwinter to gales and rain, and snow falls every winter on the Syrian mountains.

The Persian Gulf is subject in winter to strong winds of the north-westerly (Shamal) type, with occasional gales and squally heavy rains and thunder; the alternative wind from the south-east also brings similar weather in that season. There is seldom bad weather between mid-April and mid-October, but the damp heat becomes excessive and visibility is often bad.

From Bandar Abbas to Karachi the route enters the monsoon region. The rainfall is uncertain. During the winter months the north-west wind and bad weather prevail, as in the Persian Gulf. On the north of the Gulf of Omar such weather, though alternative with

frequent calms, may be experienced at any time of the year. The south-west monsoon prevails in summer, especially towards Karachi. Inland the mountains cause erratic conditions; on the delta of the Indus storms are rare.

CONCLUSIONS.

What police, militia, or military forces will be necessary to guard aerodromes, etc., is a problem which does not come within my province—except as a taxpayer; this has to be decided by our military advisers, but, granted political co-operation, this should not be a serious matter, and certainly less difficult and hazardous than securing a long line of railway—say the Bagdad Railway, with its many tunnels and bridges, etc.

The necessity for quicker transport and communications seems to become daily, almost hourly, more important; the control and administration of the world's affairs appears to be more and more centralized in fixed places as time goes on, and less freedom of action is given to the man on the spot, as was the rule and necessity in pre-telegraph and railway days. This is a factor which has to be faced, and I do feel that at the present time, with few exceptions, sufficient use is not being made of the air. The military and—may I whisper—naval problems are being examined; yes: but do you not think that a vast field remains unexplored in the maintenance of direct contact between our outposts and their respective headquarters, thus cementing further the link of the Empire?

Consider the difference in speed (apart from travelling under infinitely more comfortable conditions) of the aeroplane, with a cruising speed of 90 to 100 miles an hour, and that of the camel with his 2 miles an hour, the steamer anywhere from 4 to 16 knots, and the railway averaging, say, 25 miles an hour.

In many cases men administering vast tracts of territory are cut off by hundreds of miles geographically and months in point of time from civilization, when frequent and speedy communications would be something more than a godsend. I think of the tragedy of General Charles Gordon and what might have been done to assist him had there been aircraft in those days. It is possible that similar situations may arise in the future. Equally important uses in the field of commerce—the early stages of surveying a new railway, exploration of new fields of enterprise—occur to one. Take, for instance, a journey from Cairo to Mosul (assuming the oil to be there) by sea, etc.; it takes some three to four weeks, whereas by air it is a matter of about eight hours.

Now, having spoken for so long about the possible uses of aircraft, I am, naturally, asked, "What is the best application of aircraft?" The answer is simple: Mails for one thing and competition for quick

intercourse for another. I feel the means by which this can be carried out are worthy of our very serious consideration. Should aviation compete with railways by land and ships by sea? The answers appears to be, No. Aerial travel is an addition to the present means of transport, not a competitor. Should it happen that in the distant future the main carrying of the world's commerce is through the air, well and good. May it not be analogous to the advent of the railway replacing the stage-coach, the steamer, the sailing ship? which was, after all, the process of steady evolution keeping pace with scientific achievement. In the meantime it is too early to speak of such things except with reserve; progress must be made step by step on sound lines commercially and technically with the means now at our disposal, using each to the best of our ability for the benefit of humanity, and not fearing to take advantage of this attractive infant prodigy—aviation.

The CHAIRMAN: Ladies and Gentlemen,—Being, I fear, a very ignorant layman with regard to these matters that have been treated of this afternoon, I would not dream of occupying your time by any observations of my own on the most excellent paper to which we have just listened; but I understand that there are in this audience several gentlemen who are most admirably qualified to speak on the subject, and I am sure we should be very grateful if they would favour us with their views. I would, in the first place, ask Sir Frederick Sykes if he would kindly give us any observations he may wish to make.

Major-General Sir FREDERICK SYKES, Controller-General of Civil Aviation: Mr. Chairman, Ladies and Gentlemen,—Captain Acland has surveyed such a wide area that it is a little difficult for me to take up any points and amplify them; but I will try to do so. He mentioned the point in regard to turning from a war to a peace basis, which of course is a very difficult matter in the air, as it has been in many other directions. It is perhaps even more difficult in air matters than in others, because the whole development of the air was brought to a head by means of war objects, so that really we had nothing to go on. We sat down at the end of the war to think out the directions in which this great movement could best be used. The machines had all been developed for war purposes; the special attributes had been speed and manœuvrability and weight-carrying capacity for bombing purposes. Those attributes had in some cases to be diverted—that is to say, in the commercial machine great speed and manœuvrability were not so essential. Weight-carrying was very desirable, but safety and reliability were the most important factors. To gain the confidence of the public reliability and safety had to be put before everything. Whether it was from the point of view of the public subscribing capital for companies which might be

promoted, or from the point of view of their being carried themselves, or their mails or their goods, it all came to the same thing: reliability and safety had to be considered first. The aircraft constructors at once took up this line and did what they could as a temporary measure to modify existing types; and Captain Acland has described the great results which have been achieved by the Vickers-Vimy in its modified peace form. I think it is a matter of great credit to the company that they have been able to do so much with a machine which was originally designed for war purposes. It has flown over a large part of the world. Other machines have also been modified, but to put commercial flying on a sound basis it is recognized that we must really design and build for definite commercial use. This naturally means a very large outlay of money. Also, although design is the heart and core of the whole of the movement, new and improved designs are of no value unless the resultant machines can be used. Therefore air transport, in my opinion, is the great object which we should have in view in order to develop aviation in peace. Service aviation can only, under the restricted conditions of finance, be carried up to a certain point. Design for war purposes must of course continue; but civil design, commercial design, can also greatly help forward war design, and, if it develops to the extent we hope, can maintain a large industry, both in regard to construction and the operation of the machines turned out by the constructors and designers. As Captain Acland has shown you, this was progressing during last year very rapidly when we consider the adverse conditions under which it had to start. We hope that the Government agreement to subsidize will help to hasten forward this movement, as I feel quite certain it will. Turning to minor points, Captain Acland has mentioned the genesis this year of a successful type of amphibian. In my opinion the amphibian is one of the most important developments which has occurred in air matters for a very long time; you have only to think of the advantage of using a machine which is equally suitable for water or land work to appreciate the extraordinary advance which is made over a machine which can only use one element. To take one small instance, if you can get a machine which can fly in a direct stage to Malta, and in a second stage to Egypt, instead of pursuing a tortuous course via Lyons, Italy, the Straits of Otranto, and possibly Greece and Suda Bay in Crete—the route we had to take during the war to get some of our machines out to Egypt—the difference in relative distances is very great. If we intend to develop aviation on an Imperial basis, we must concentrate on reaching Egypt in two direct stages via Malta, for, although our French and Italian friends are prepared to render us every assistance, I am sure you will agree that we must use every effort to establish an all-red route to Egypt to connect this country with the hub from which

our other two red routes, to South Africa, India, and Australia, radiate. The amphibian will help us enormously in that direction. In regard to airships, the main difficulties which confront us are their great cost, problems connected with their design, and the fact that their development, compared with that of the aeroplane, was not pushed forward during the war. But I think that we shall be able to develop the airship to a certain extent within the necessarily limited finances at our disposal.

It is our intention to put the airship station at Pulham, which is now to be run by my department, on a commercial basis, so that we can demonstrate in a practical way that the operation of airships is commercially sound, and offer any company which may be formed in the future to take them over the results of the experience gained in a really tangible form. The mooring mast is one of the most important factors in the operation of the airship. I was up a mooring mast yesterday at Pulham, and I can assure you it is not as easy as it appears to put up the girder arrangement, such as you have seen on the screen, and tie up an airship to it. But we have very good brains working out the problem, and I think we are moving in the direction of success. What we wish to prove is that the mooring mast will be effective whether it is situated close to the airship sheds or at a temporary base in Egypt, Malta, or elsewhere. R24 did some very useful work at a light mooring mast, but of course she was a comparatively small airship.

Although the flights across the Atlantic—both by aeroplane and airship—the flights to South Africa and Australia, all had enormous value in showing what can be done, it must be recognized that commercial flying day in and day out on a reliable, safe, and regular basis, is a very different thing. That is what we—constructors, Government Department, and everybody else concerned—have got to prove out. That is what we are steadily working at now; and I am quite certain that, whether this year, next year, or in the years to come, that result will be achieved. (Applause.)

The CHAIRMAN: Will Dr. Chalmers Mitchell say something?

Dr. CHALMERS MITCHELL, F.R.S.: Lord Carnock, Ladies and Gentlemen,—I really came here to do myself the pleasure of hearing Captain Acland speak, not with the least intention of speaking myself. However, as you have kindly asked me, there are one or two things I should like to say. First I should like to join with General Sir Frederick Sykes in congratulating Captain Acland and his associates in the Vickers Company on the marvellous success of their adaptation of the war type to the Vickers-Vimy commercial type. My own practical experience is not great, but it is something. I believe that the Vickers commercial type is just as comfortable a way of travelling as it is possible to have. It is certainly very much more comfortable

than a fast express train. For instance, I was able to write practically the whole time without any trouble at all, whereas I dare say you know, if you try to write with a stylograph even in a smooth-running express train, you find considerable difficulty. It is really more comfortable than an express train, and a great deal more comfortable than a fast steamer, except in the very best weather. I should like, your lordship, to say that I had the pleasure of a short trip in that very interesting new invention the amphibian, and that I agree with General Sir Frederick Sykes that it has a future of very great promise indeed. But so far as concerns the actual route from London to Cairo: I am rather more inclined to be interested in the very great experiment that General Sykes is going to introduce now, because it seems to me between London and Cairo, if we are to expect, as I think one must expect, that Cairo is going to be the aviation hub of the British Empire—almost of world aviation—in the future, I think it stands to reason that there is going to be rather heavy constant traffic between London and Cairo; traffic heavy enough and constant enough to carry the cost of a big flying-ship. I am therefore looking with very great interest to the experiments to be started presently, the attempts to try to use a flying-ship commercially between this country and Cairo. There will always be more passengers from London to Cairo than from London to the Cape, or Cairo to India. Again, one has to realize that the weather conditions between London and Cairo are usually difficult, and much more suited to the flying-ship, which can make a long non-stop run. For a very long time yet aeroplanes will be very much safer and more comfortable for passengers where there is the opportunity of breaking the journey every 500 or 600 miles at most. You have a very difficult route between London and Cairo, especially with regard to aerodromes suitable for the landing of an aeroplane. I should expect, therefore, that one of the earliest stages in the flying of the future will be airship transport between London and Cairo, taking a large number of passengers with a fair quantity of baggage on a non-stop journey—where they can sleep, dine, and have most of the comforts of modern travel—and by aeroplanes from Cairo onwards in each direction; from Cairo towards Mesopotamia and India; and from Cairo southwards to the Cape and south-westwards across to Nigeria, the latter, I think, being probably also a route of the future. I think all these are routes for which aeroplanes are most suitable. For one thing, they are routes where very mountainous regions have to be traversed, and an aeroplane has very great advantages over an airship in rising and falling over high mountains. I do not want to detain you any more; I want simply to say, as at least a middle-aged person, that I am quite certain that flying is going in a way in which a middle-aged person can travel for decently long journeys with very

much greater comfort than by any other method. I myself am a convinced believer, not only in the remote future, but in the immediate future of aerial transport for passengers. (Applause.)

Major-General E. D. SWINTON: Lord Carnock, Ladies and Gentlemen,—There is little I can add to the able lecture delivered by Captain Acland and to the remarks made by Sir Frederick Sykes and Dr. Chalmers Mitchell. One point, I think, in regard to the subject we have been hearing about this afternoon, which has special reference to the portion of the world with which the Society is connected, and which, though obvious, is sometimes lost to sight, is the fact that aerial roadways are ready made and free to all. In parts of the world as yet undeveloped, such as Central Asia, where roads are difficult to construct, railways more so, and both very expensive, this is a very important factor. From the commercial point of view the actual volume of traffic, of course, will depend on the demand, and this is true of all parts of the world. But the necessity for establishing communication through the air, apart from the volume of traffic, is greater in the less civilized parts of the world, because there we find the most marked absence of communication on the ground. The time factor also, in undeveloped countries, carries greater weight, because air transport gives a comparatively greater advantage over any other form of transport other than rail. In regard to development, roads and railways have in the past sometimes been a great assistance to the settlement of a country by the flow of the mass of traffic, either of passengers or merchandise. This I do not think will apply to air communications, which will be useful for connecting together existing centres of population, etc., otherwise separated by many days of travel across impassable country. In point of time and in point of experience the solution of the transport problem over the wilder portions of the earth's surface seems to lie in the air. Captain Acland referred to a quotation from one of Sir Frederick Sykes's speeches to the effect that Cairo would be the air hub of the world. Only this afternoon I was looking at a German pamphlet in which international air traffic in the future was discussed, and the argument of the writer was that Germany would be the centre of European air traffic owing to her geographical position, but he at the same time admitted that in the future the British Empire would be Germany's greatest competitor in the air owing to the worldwide extent of the British Empire. I do not think I have any more to say; the ground has been so well covered already.

The CHAIRMAN: Captain Sheppard, if he is here, or Sir Arnold Wilson.

Sir ARNOLD T. WILSON: My Lord Chairman, Ladies and Gentlemen,—My only title to speak is that of practical experience of flying as a passenger in the Middle East. It has been my good fortune to

fly for over three hundred hours in the past two or three years—from Bagdad to Cairo, Aleppo to Cairo, Hamadan, Basrah, Bushire, Koweit; and I was only accidentally prevented from going down to Bahrein. I have had a good many crashes, due not to any lack of skill on the part of the pilots, but due entirely to the fact that pioneer travel and unknown aerodromes involve unknown conditions. But I remain a convinced optimist. The air makes one optimistic—perhaps unduly so. None of the previous speakers has referred to what we might describe as the ground conditions; at the present moment the ground conditions in the Middle East are distinctly more unfavourable than atmospheric conditions. I am not so afraid when flying of what is in the air as of what is on the ground, and I fear that is likely to be accentuated in the near future. There is nothing a pilot is more afraid of than what is known as drift. Drift is the motion imparted to an aeroplane by a side wind of unknown velocity, and it is dangerous because while the machine appears to be moving in one direction it is actually going in another direction. There is such a thing as drift in politics; we have it frequently at the present moment, especially in the Middle East, and if we do not make some allowance for the unfavourable winds which are now blowing there, we shall have a crash, and a very bad one. Turning to subjects more within the scope of this lecture, we have had a certain amount of experience of using aeroplanes in connection with Government purposes in Mesopotamia for surveys. We found we could get surveys completed sufficiently satisfactory for ordinary purposes at two-fifths of the cost and in one-fifth of the time—a very satisfactory result. I do not suggest that it is equally applicable to all countries and all sorts of surveys, but within limits the aeroplane has exceptional value for survey work. My own experience is that future air routes will be hampered not so much by climatic conditions, which, as the chart showed, are normally good in the Middle East, but by the absence of good communication. Aerodromes require very considerable quantities of petrol, spare parts, hangars, and the like, and these have to be transported by rail or road. To maintain an aerodrome at Hamadan in Persia at an altitude of 6,000 feet, and with a thermometer going down to approximately zero for two or three months at nights in the winter; to maintain a hangar at Bagdad, only 300 miles away, with a thermometer going up to 160° in the sun for three months during the summer, with nothing between them except very indifferent road, and a people who have become accustomed to regard the aeroplane as an enemy rather than a friend—and who cannot resist the temptation of shooting at the bird—involves difficult problems which we have to face. We have not failed to do so, but they involve risks which a commercial company cannot be expected to take on at the moment. The traffic is there, both mails and

passengers, but the ground conditions are not such as to give immediate hope. Most countries that we know have been through somewhat similar conditions to those now prevalent, and I can only express the pious hope that before long satisfactory conditions will reign in the Middle East. (Applause.)

The CHAIRMAN: I think, ladies and gentlemen, we are very fortunate in having had the advantage of listening to the remarks from the distinguished gentlemen who have been good enough to address us, and I think I shall be interpreting your wishes if I move a very hearty vote of thanks to Captain Acland for the very interesting lecture which he has been kind enough to deliver to us.

The vote of thanks was most cordially given to the lecturer.