The Third Air Conference.

By Prof. L. BAIRSTOW, F.R.S.

THE Air Conference at the Guildhall, London, occupied four sessions — the mornings and afternoons of February 6 and 7—the first day being devoted to the reading of papers, and the second to their discussion. Of the papers read, that of greatest interest to men of science was by Sir Geoffrey Salmond, the Air Member for Supply and Research on the Air Council, on "The Progress of Research and Experiment." Before referring to this paper and the subsequent discussion, it is desirable to note some of the points made by Sir Samuel Hoare, the Secretary of State for Air, who spoke immediately after the opening ceremony by the Lord Mayor of London.

It was pointed out that the new Air Ministry had only been in office for three months and that the time had been all too short for the determination of a fixed policy. Later speakers emphasised the importance of the earliest possible declaration of policy, and were not wholly inclined to agree that, so long as the world is in a state of confusion and uncertainty, military aviation must have the first and principal call on the nation's purse. It was argued that civil aviation will have the same relation to the Air Force as the mercantile marine has to the Navy, and that the most economical expenditure of money would lead to a rearrangement of the vote so as to give a greater share to the commercial aspect.

It was argued by one speaker that private enterprise would be ready to find the capital for aerial transport when once it felt certain of a continuous and sympathetic policy on the part of the Air Ministry. The Secretary of State for Air had previously said that he was trying to develop a consistent civil aviation policy, and for weeks past had been considering schemes for its organic development.

The Conference was assured that the Air Ministry fully realised the importance of research and was anxious to foster it within the limitations imposed by finance. It is necessary to bear in mind the fact that the word "research" does not mean the same thing to all men, but in the sense in which that word is understood by men of science, there is a marked improvement in policy. It may be some time before the effects of the change are evident in results, for we have fallen on evil days, but it is to the good that the tide has ceased to ebb.

The Air Ministry organisation was described by the Air Member for Supply and Research in his opening paragraphs. He said: "Perhaps I may be forgiven if I describe to you our organisation for research, as I fear it is sometimes misunderstood. In the first place, there is the Air Ministry charged with the general direction of research. The Air Ministry is advised by the Aeronautical Research Committee, either on the initiative of the Air Ministry or on the initiative of the Aeronautical Research Committee, as to the problems to be solved, or as to the methods by which they should be solved. A representative of the Aeronautical Research Committee works in the Air Ministry and has direct access to me on all questions.

"The Aeronautical Research Committee does invaluable work in investigating all sorts of problems, and is wonderfully assisted in its work by the National Physical Laboratory and a whole body of scientists who give their services free to the nation, as well as by the great universities and consulting engineers.

"These organisations deal with the theoretical solution of air problems in the domain of pure research. But research cannot stop here; its practical application has to be considered, and this portion of the work is carried out by the Royal Aircraft Establishment at Farnborough and various experimental stations such as the Aircraft Experimental Establishment at Martlesham, and the Marine and Armament Experimental Establishment, Isle of Grain.

"A third organisation also exists, and that is the Aircraft and Aero-engine Constructors, who maintain most capable designing staffs who constantly bring forward solutions of problems, which enable us to step forward. I would be failing in my duty if I did not here acknowledge the debt this country owes to all these organisations, the joint efforts of which have undoubtedly brought our world position as regards research to a position second to none."

This constitutes the clearest statement of the organisation yet given, and it will be obvious to readers of NATURE that research as defined by the Air Member for Supply and Research has a much wider range than research as understood by men of science. In his interpretation, all technical development and experiment is included, and there is an absence of recognition of the usual criterion as to the fundamental or specific nature of the inquiry. It is in conformity with this definition that the Director of Research in the Air Ministry has wholly different functions from the Director of Scientific Research in the Admiralty. With adequate subdivision of funds and duties the matter of definition is unimportant, although the effect is the nominal allocation of a large sum for research, while in fact only a small fraction is devoted to scientific operations. There are marked indications of a welcome change, and that the advice of the Aeronautical Research Committee as to need for greater attention to fundamental inquiries is being acted on.

Sir Richard Glazebrook, chairman of the Aeronautical Research Committee, made during the Conference a special appeal for fundamental research, giving as subjects the study of the motion of viscous fluids from first principles, the provision for full scale research on airships should these again come into operation, and the study of the motion of aeroplanes in flight. All these forms of inquiry are greatly assisted by laboratory experiments and wind channel tests on models of aircraft.

The mathematical treatment of viscous fluid motion has not hitherto received any direct recognition by the Air Ministry, although the programme of the Aeronautical Research Committee leaves an opening for the staff of the National Physical Laboratory. The inquiry is, however, being fostered by the Department of Scientific and Industrial Research, and by the governors of the Imperial College of Science and Technology. Sir Richard Glazebrook asked for favourable consideration of such research by the Air Ministry.

The position of airship research was shown by the inquiry into the disaster to R38, but, in pursuance of instructions from the Air Ministry, the Aeronautical Research Committee has been unable to carry out its programme. A paper by Commander C. C. Burney on "The Establishment of a Self-Supporting Airship Service" has led to a reopening of the subject and to a divergence of opinion between the Air Ministry and Admiralty which is generally regretted. It appears that the Admiralty needs airships and is prepared to pay for them, but that the Air Ministry considers itself to be the proper body for supervising their construction. While it is hoped that the latter body will prevail, it would appear to require a change of policy and a real desire to retrace its disastrous past. Sir Alan Anderson expressed the point briefly when he asked whether it was really necessary to build airships at

considerable cost in order to put them into sheds and let them decay. Probably this action, typical of late policy, had much to do with the objections voiced by representatives at the Air Conference to the predominance of a military policy.

For heavier-than-air craft the feeling of the Conference appeared to be that the tide was turning, notably in the case of fundamental research. Sir Geoffrey Salmond mentioned many specific experiments and a few fundamental inquiries. Those relating to safety and trustworthiness received most attention in the discussion; but one item can be dealt with here. The dangers of flying are few so long as the engine is running perfectly, a state which cannot be relied on to persist for many consecutive hours. Failure of the power plant brings about a forced landing, and where the ground is unsuitable an accident follows. The dangers are increased by a peculiarity of an aeroplane when its wings are inclined to the wind at more than twenty degrees, for it then becomes uncontrollable. During the past year the trained and skilled experimental pilots of the Royal Aircraft Establishment, working in co-operation with a panel of the Aeronautical Research Committee, have modified an aeroplane and flown it at an angle of forty degrees. This is a momentous advance, for it leads to the hope that the danger arising from lack of control may be greatly reduced by further knowledge. It is therefore gratifying to find that the Air Ministry is ready to provide special aeroplanes solely for research by the Aeronautical Research Committee. It will be necessary to develop instruments for the inquiry, for we are still without adequate means of observation in flight except for the simplest types of motion, but again the Air Ministry is ready to give assistance.

Our lead in aeronautical research has been greatly reduced by America, but we appear to be regaining our power for progress, and a continuation of present policy may be expected to lead to that progress in aviation which is so clearly required for projected developments in civil aviation and for the defence of the realm.

Industrial Applications of the Microscope.

A MEETING of the Royal Microscopical Society was held on January 24, for the purpose of inaugurating an important departure in the history and attitude of the society towards national industry by the formation of a special section to deal with the industrial applications of the microscope.

Prof. F. J. Cheshire, president of the society, in his opening address, said that many years ago it had been seriously contended by some pessimistic fellows of the Society that its principal work of usefulness was done. Events of late years, however, had refuted that contention. Why, it was asked, have we a Royal Microscopical Society and not a Royal Telescopical Society? The answer was obvious. In the case of the telescope, practically any tyro could take out an instrument, of which he knew nothing or very little, direct it to the moon or any other object, and could, with a little practice, obtain the very best image which that telescope was capable of giving. The microscope could not be used in that simple way. It was the most complicated of all the optical instruments in common use, and it demanded, in its user, a considerable amount of optical knowledge and manipulative skill before it could be used efficiently and satisfactorily. The use of the microscope as a tool was extending day by day, advancing step by step with the recognition of the great importance of the study of micro-organisms and micro-structures. The Royal Microscopical Society had already carried out certain work in connexion with the industrial applications of the microscope. Sections, dealing with metallurgy, the manufacture of leather and of paper, had been in existence for a short time, but it was recognised that these specific sections made it difficult for the society to deal, as it ought to do, with the practical applications to new industrial work. In these circumstances it had been decided to form a large general section dealing with industrial applications of the microscope. The work of the section would be to encourage, in every possible way, the use of the microscope in industry and, at the same time, to give the most generous assistance to workers in the new fields of endeavour. Any one interested, whether a fellow of the Society or not, would be cordially invited to attend the meetings of the section.

A communication by Dr. F. J. Brislee dealt with the necessity of providing facilities for more definite instruction and training in the practical use and manipulation of the modern microscope, and outlined the manner in which the Royal Microscopical Society could be of assistance to those who had to use the microscope in industrial processes. Dr. Brislee further indicated the lines on which this practical training should proceed, starting with low-power work, the preparation, mounting, and examination of specimens, and proceeding gradually to the more difficult problems.

Dr. J. S. Owens (Superintendent to the Advisory Committee on Atmospheric Pollution) read a communication on atmospheric pollution. The importance of this subject to those working in large factories and to the general health of the community was insisted upon, and many interesting exhibits and lantern slides illustrated the means by which samples of polluted air were collected and examined. The method adopted is one in which a given volume of air is collected and then deprived of suspended matter by causing it to issue from the container as a jet and impinge against a prepared glass surface. Many unsolved problems were submitted to the meeting and suggestions invited as to the best methods of determining the actual nature of the particles of dust, oil, micro-organisms and other foreign matter collected.

In connexion with the leather-making industry, Dr. Browning suggested the more general use of the microscope in the control of the various processes. He showed sections of skin before and after puering, and stated that *if* it was necessary to remove the elastic tissue by puering, then this could be controlled only by the use of the microscope. Samples examined from several sources showed that different manufacturers were content with more or less removal of the elastic tissue. They could not all be right. Every detail in the preparation of specimens and the cutting of sections of leather was practically demonstrated by Miss Scott, and finished slides were exhibited.

Apparatus specially constructed for research work in many industries was demonstrated and described by Messrs. J. W. Atha and Co., R. and J. Beck, Ltd., The Cambridge and Paul Instrument Co., Ltd., Ogilvy and Co., J. Swift and Son, and W. Watson and Sons, Ltd.