

SHAW—INTERNATIONAL GEODETIC AND GEOPHYSICAL UNION 23

THE METEOROLOGICAL SECTION OF THE INTERNATIONAL
GEODETIC AND GEOPHYSICAL UNION.

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[Read at a Meeting of the Society, November 22, 1922.]

THE INTERNATIONAL RESEARCH COUNCIL.

AS the duration of the war drew on from six months, a year, two years and more, towards four years, the Academies of Science of the allied countries became solicitous about the future of scientific work on an international basis. A conference was held in the Rooms of the Royal Society of London in October 1918. It arrived at a resolution :

1. Aussitôt que les circonstances le permettront, les conventions relatives aux Associations scientifiques internationales seront, conformément aux Statuts ou règlements propres à chacun d'elles, dénoncées par les groupements compétents des Nations en guerre avec les Empires centraux.

Les nouvelles Associations reconnues utiles au progrès des sciences et de leurs applications seront établies, dès maintenant, par les Nations en guerre avec les Empires centraux, avec le concours éventuel des neutres.

A second conference was held in Paris in November 1918, at which a project was mooted for the establishment of an International Research Council ; Brussels was chosen as its legal seat. Its operations in respect of finance and other legal aspects were to be conducted in accordance with Belgian law. In pursuance of this decision the first plenary sitting of the International Research Council was held at Brussels in July 1919, and a body of statutes was adopted on the 28th of that month.

The statutes are twenty-five in number divided into eight chapters. The first chapter sets out the objects of the Council ; the second the seat of its governance ; the third lays down the conditions of admission of countries to the Council ; the fourth provides for the administration of its business ; the fifth contains the regulations for an Executive Committee consisting of four persons (a president, two vice-presidents, and a secretary) to conduct the business of the Council in the intervals between general assemblies ; the sixth regulates the aforesaid general assemblies to be held as a rule every third year ; the seventh chapter prescribes the pecuniary contributions and the voting rights of the several countries adhering to the Association, graded according to the numbers of their inhabitants ; and the eighth limits the duration of the convention to twelve years from January 1, 1920, makes provision for its renewal, and also for changes in the statutes.

The following extracts from the statutes may be quoted :

I. OBJECTS OF THE INTERNATIONAL COUNCIL

The purpose of the International Research Council is—

(a) To co-ordinate international activity in the different branches of science and of its applications.

(b) To promote, in accordance with Article 1 of the resolution of London (October 1918), the creation of international associations or unions, which are considered useful for the progress of the different branches of science.

(c) To direct international scientific activity where suitable associations do not exist.

(d) To enter, by suitable means, into relation with the Governments of the countries adhering to the scheme, in order to promote the study of questions of which they are cognisant.

III. ADMISSION.

4. A country may adhere to the International Research Council or to the Associations which are connected with it, through its National Academy, through its National Research Council, through other similar national institutions, or through its Government.

5. The statutes of associations connected with the International Research Council must be approved by the Council.

Whether, in accordance with 4, the same country could adhere in two capacities is not stated.

The *Year-Book of the Royal Society*, 1922, p. 131, summarises the proceedings of these conferences and assemblies as follows :

An International Research Council was formed for the purpose of facilitating international co-operation in scientific work, and promoting the formation of International Unions in different branches of science.

The affairs of the International Research Council are managed by an Executive Committee, the General Secretary of which is Sir Arthur Schuster, For.Sec.R.S.

Under the auspices of this Council, International Unions have been formed for Astronomy, Geodesy and Geophysics, Chemistry, Mathematics, and Radio-Telegraphy, and provisional statutes have been drawn up for International Unions in Physics, Geology, Biological Sciences, and Geography.

The Royal Society, acting as the National Academy of Great Britain, appoints the British delegates to the meetings of the International Research Council.

NATIONAL COMMITTEES.

For each International Union a National Committee either has been formed, or is in process of formation in accordance with Statute 1, Clause 2, of the International Research Council. The functions of these National Committees are defined in the statutes of the various Unions. In general, they are the promotion of the branches of science with which they are concerned ; more especially as regards international requirements, the appointment of delegates to represent the United Kingdom at meetings of the Unions, and the initiation of proposals or questions for discussion at such meetings.

National Committees of the United Kingdom for Astronomy, Geodesy and Geophysics, Mathematics, Physics, Radio-Telegraphy and Geography have been constituted by the Council of the Royal Society.

The members of the Executive Committee of the International Research Council are :

President—Emile Picard, Secrétaire perpétuel de l'Académie des Sciences, 25, quai Conto, Paris (6).

General Secretary—Sir Arthur Schuster, D.Sc., F.R.S., Foreign Secretary of the Royal Society, Yeldall, Twyford, Berks.

Members—G. Hale, Director of the Mount Wilson Observatory, Pasadena, California, U.S.A. G. Lecointe, Director of the Royal Observatory, Member of the Royal Academy of Belgium, Avenue Circulaire, 1, Uccle. V. Volterra, Senator, President of the Accademia dei Lincei, Professor of Mathematical Physics at the Royal University of Rome, via in Lucina, 17, Rome.

At a meeting of the Council held at Brussels this year on July 25 and four succeeding days, it was decided to enlarge the Executive Committee by the addition of a representative from each of the separate Unions. Twenty countries have now joined the International Research Council. Some others have joined or desire to join the Geodetic Section alone.

THE INTERNATIONAL GEODETIC AND GEOPHYSICAL UNION.

It will be noted that under the auspices of the International Research Council there are a number of separate Unions each of which manages its own affairs, in accordance with statutes which must have received the approval of the Council.

Within each Union are separate Sections with separate Bureaux of President, Vice-Presidents, and Secretary, and an Executive Committee. The Union with which we are specially concerned is the Union for Geodesy and Geophysics which comprises the following sections: (1) Geodesy, (2) Seismology, (3) Meteorology, (4) Terrestrial Magnetism and Electricity, (5) Oceanography, (6) Vulcanology. A new section (7) for Land Hydrography was constituted at Rome in the present year.

For each Union there is supposed to be in each country a National Committee. The National Committee for Geophysics and Geodesy in this country is appointed by the Royal Society as follows:

Chairman—Colonel H. G. Lyons. *Members ex officio*—The Astronomer-Royal, the Director of the Meteorological Office, the Director-General of the Ordnance Survey, the Hydrographer of the Navy. *Other Members appointed by the Royal Society, till December 31, 1924*—Dr. C. Chree, Sir Richard Glazebrook, Col. E. H. Grove Hills,¹ Mr. J. H. Jeans, Sir Joseph Larmor, Sir Napier Shaw, Prof. H. H. Turner; *till December 31, 1927*—Prof. S. Chapman, Mr. A. R. Hinks, Prof. H. Lamb, Sir G. Lenox-Conyngham, Col. H. G. Lyons, Sir Arthur Schuster, Mr. G. I. Taylor, Mr. C. T. R. Wilson. *And the following representatives of other bodies:*

Of the Royal Irish Academy: Prof. J. Joly, Dr. A. A. Rambaut.

Of the Royal Society of Edinburgh: Dr. C. G. Knott,¹ Dr. A. C. Mitchell.

Of the British Association: Dr. J. E. Crombie, Mr. J. J. Shaw.

Some of the adhering countries divide their national committees into separate sections corresponding with those of the Union. In this country, so far, we have not done so. The United States, for example, has a National Committee of 64 members, of whom 23 form a Section for Meteorology, other 24 Terrestrial Magnetism and Electricity, and Physical Oceanography respectively. France has a National Committee of 124 members, of whom 49 constitute a Sectional Committee for Meteorology. The Italian Committee for the Meteorological Section comprises 22 members. Our National Committee includes only 25 members to deal jointly with all the seven subdivisions or sections.

THE METEOROLOGICAL SECTION AND ITS PROGRAMME.

The new feature of this international association for the advancement of science is that there is a certain amount of money placed at the

¹ Since deceased.

disposal of the sections. Each country adhering to the Union makes a contribution thereto, and the Union divides its funds among the sections. The sums which were announced as being at the disposal of the Meteorological Section were an accrued sum of 32,542 francs, and a prospective income of 22,400 francs a year for three years. These sums are subject to some modification in consequence of the variations of the exchange and the decisions of various countries concerning membership.

When the Section for Meteorology was constituted at Brussels I was appointed President of the Sectional Bureau; Monsieur Angot, Vice-President; and Dr. C. F. Marvin, Secretary. As the time of the proposed meeting in Rome drew near I was appealed to by the Secretary of the Union to compile a programme for the Section. One of the regulations is that the subjects for consideration must be submitted by the respective national committees.

A PROGRAMME OF RESEARCH ON AN INTERNATIONAL BASIS.

An obvious difficulty about providing a programme that might reasonably come within the purview of a Council of Research, is the peculiar nature of meteorology as a science. Research in meteorology in its best sense means the co-ordination of material derived from various parts of the world at various times, and its application to our enlightenment upon the structure of the atmosphere and the changes which occur in it. In order to discuss any question which depends upon the structure of the atmosphere, information is required about it from all parts of the world, at all levels, and at all times and seasons. It is easy to say that such a demand is extravagant and preposterous because obviously it cannot be satisfied. In spite of that criticism it must still be pronounced indispensable, for in so far as the information is lacking it has to be guessed by the researcher, or in the alternative it has to be regarded as unimportant for the immediate object. It is a very sorry alternative because it means basing the hypothesis of its insignificance upon ignorance of the facts, which is the worst possible form of science. If any meteorologist wants to go a-guessing let him begin by estimating the volume of the meteorological scrap-heap that has accumulated in the last hundred years through guessing at facts and guessing wrong.

If, therefore, any institution would encourage research in meteorology it should pay attention to two requirements, first of all the filling of the gaps in our knowledge of the facts of the atmospheric structure, and secondly the reviewing, or shall I say the parading, of the facts which are available to stimulate productive discussion by those minds which are capable of passing a vast collection of facts through a recognised deductive mill, or, still more difficult, of making a true inductive scientific picture out of the facts which of themselves, at the very best, must be of the nature of a coarse mosaic.

THE COLLECTION OF DATA.

As regards the collection of data a special point for consideration arises in connection with meteorology. It is not altogether a new departure; we are quite familiar with international organisation for

collecting suitable data. Since 1853 the established meteorological institutions of the world have been united in the endeavour to collect such ordinary meteorological observations from the sea as are suitable for the study of the structure of the atmosphere; and since 1873 that spontaneous union has been extended to include all such observations from the land. These include observations, at the surface, of pressure, wind, temperature, humidity, precipitation and weather, and, above the surface, of the forms, direction and motion of clouds. The measurement of the height of clouds has also been organised on an international basis. Since 1896 observations of the upper air have been similarly cared for. It would be little less than absurd to start again in 1922 from the position of our predecessors in 1853 and do it all over again. But any one who has endeavoured to put together the available facts of meteorology for the whole globe must have become aware how every effort is frustrated for lack of observations—either of ordinary observations from some special localities or still more frequently of special observations from many localities. In illustration of what I mean I may note that the first demand of the new Norwegian School of Meteorologists was for five hundred ordinary stations and some special ones, round about latitude 60° , for the adequate exploration of the polar front; and at the same time Professor van Bemmelen bewails the lack of observations in the intertropical regions. Now we can safely leave the extension of information by means of ordinary observations to the established agencies, who are already agreed as to methods, and who want the information for their immediate practical purposes.

THE GAPS IN OUR KNOWLEDGE.

But consider some other gaps in our knowledge:

1. The lack of observations of temperature and wind-velocity in the upper air over vast areas of sea, over deserts or inhospitable regions which have their share in the control of the atmospheric circulation, although they are quite beyond the ordinary reach of meteorologists attached to established institutes or observatories.

To get these we must obtain new sources of observation by persons who are more favourably placed than the ordinary meteorologist.

2. How extremely ill-informed we are about the actual detail of the process of convection which we know to be an essential part of the formation of rainfall. We do not even know whether convection proceeds by general mass-movement or per quantum, and, if per quantum, what the size of the quantum is. Which of all the meteorological observers of the world pays special attention to this question?

3. What is the immediate, and what the ultimate, effect of an active convection upon the surrounding atmosphere, and what is the true meaning of the relation between pressure and temperature, which Mr. W. H. Dines has found in the English observations of the upper air, and which exists in like manner in Canada and at the Equator?

I have read a good deal about what it does not mean, and gather that some people think it means nothing at all. They are satisfied that it is only what we ought to expect from what we know of the physical properties of the atmosphere. Let me remark that, whether we expect it

or not, we have to put up with it; but the really interesting question is what it means: whether in fact isobars in the atmosphere are also isotherms, or, to put the question in the language of V. Bjerknes, is the atmosphere normally and generally barotropic? or if not, is the baroclinic condition general or local?

4. Next consider our ignorance of the rôle of radiation in the sequence of weather. Recently our knowledge of solar radiation has been much extended, particularly in the United States, in Sweden, and in Switzerland. Mr. W. H. Dines has also done much lately in terrestrial and atmospheric radiation. It used to be generally assumed that air rose over the equator, drifted to the tropics, and having lost its heat by radiation came down again then and there. I believe that to be a fairy tale, but to prove it so requires the examination of the contributions which I have mentioned, and some more.

5. Next we may note the old vexed question of the impairment of the visibility of the atmosphere. What is that condition which I will call *nebula*? It prevents our seeing, yet we cannot recognise it as *nubes*, a cloud. Is *nebula* water condensed on hygroscopic molecules, or is it partly or wholly dust? It is an interesting question, and the Committee for Atmospheric Pollution has recently brought forward an apparatus for abstracting samples of the dust and nailing them to a microscope-slide. We have therefore made possible a definite step in the solution of this question, and have produced a method which can be employed in other atmospheres than those of this city or country.

6. And finally, there is the vexed question of the composition of the atmosphere above 100 kilometres, which has now become of great importance in relation to the aurora through the work of the Norwegian geophysicists, Birkeland, Störmer, Vegard, and Krogness. Is hydrogen the main constituent or is it not?

These six questions are all of living reality and ought to be solved, but not one of them can be definitely assigned as the recognised duty of any existing Meteorological Service. They were therefore brought before the Meteorological Section of the International Union by the British National Committee at the suggestion of a Committee of the British Association as questions in the solution of which the Section might assist and which might otherwise linger on unsolved, being left to the precarious attention of the leisure of men otherwise occupied.

The questions proposed by France were of a more general character:

- (1) The different sorts of thunderstorms and more generally the electrical phenomena of the atmosphere.
- (2) The transparency of the atmosphere and its optical phenomena.
- (3) The different sorts of clouds.
- (4) Forecasting weather, and particularly the method of tendencies or the method of isallobars.

The Italian Committee added a further question, namely, the necessity for presenting normals of meteorological data according to modern statistical methods.

These, and a few subjects added with permission of the Section by some of the meteorologists present, furnished the scientific programme of the meeting.

THE PROCEEDINGS AT ROME.

After a ceremonial session of both Unions in the Hall of the Horatii and Curatii of the Capitol in the presence of His Majesty the King of Italy, separate meetings of the Astronomical Union and the Geodetic and Geophysical Union were held, and then the Sections met separately; they united again in meetings of the respective Unions at the close of the proceedings.

The meetings of the Section were open to any delegates who were present. In the Minutes I find the following names mentioned—in some cases I have had to guess their country:

Australia.—The Rev. F. Pigot, S.J.

Belgium.—Commandant J. Jaumotte (Uccle).

France.—Colonel E. Delcambre (Paris), M. G. Bigourdan (Paris).

Italy.—Prof. G. Alfani (Florence), Prof. A. Artom (Turin), Prof. A. Bemporad (Naples), Prof. L. de Marchi (Padua), Prof. F. Eredia (Rome), Prof. P. Gamba (Pavia), Ing. Capa. M. Giandotti (Parma), Gemes, Jose, Colonel L. Matteuzzi (Rome), Murguia, Prof. C. Negro (Turin), Prof. L. Palazzo (Rome), Prof. Gaetano Platania (Catania), Prof. Giovanni Platania (Catania), Prof. B. Paoloni (Montecassino), Petri, Prof. G. B. Rizzo (Messina), Prof. C. Somigliana (Turin), Prof. L. Taffara (Rome), Lieut. Mario Tenani (Vigna di Valle), Prof. F. Vercelli (Trieste), Conte Antonio Cittadelle Vigodazere (Turin).

Portugal.—Prof. Azevedo Gomes (Lisbon), Vice-Admiral Neuparth.

Spain.—Colonel Juan Cruz-Condé (Madrid).

Sweden.—Dr. Axel Wallén (Stockholm).

United States.—Dr. H. H. Kimball (Washington).

There was a tendency to regard the meeting as an ordinary assembly for reading and discussing papers regardless of the new feature of the disposable francs; but in the end a number of resolutions found their way into the Minutes and have provided the Bureau of the Section with sufficient occupation for the two years that elapse before the meeting in Madrid.

At the end of the meeting the Executive Committee of the Section was constituted as follows:

President.—Sir Napier Shaw.

Vice-Presidents.—Colonel Delcambre, Dr. Marvin.

Secretary.—Professor Eredia.

Other Members.—Professor Gamba, Dr. Simpson, Dr. Wallén.

Meteorologists are also interested in the proceedings of the sections for Terrestrial Magnetism and Electricity (President, Dr. C. Chree), Physical Oceanography (President, the late Prince of Monaco), Land Hydrography (President, B. H. Wade), and perhaps also Vulcanology. On account of the impossibility of being in two places at the same time I can only speak of a joint meeting with Terrestrial Magnetism at which the question of thunderstorms was discussed by Dr. Simpson, Dr. Bauer, Sir Arthur Schuster, Commandant Jaumotte, Dr. Chree, and Dr. Pacini. We also heard about penetrative radiation (Dr. Millikan) and the relation of sunspots and atmospheric electricity (Dr. Bauer).

The operative resolutions of the Meteorological Section were:

1-2. *The Upper Air.**Ballons-Sondes.*

(a) That the Meteorological Section places at the disposal of the Executive Committee of the Section a capital sum of 15,000 francs for the initiation of the exploration of the upper atmosphere by means of *ballons-sondes*, in regions either on land or on sea which are of special importance from the point of view of the general circulation of the atmosphere, and which at present have no effective meteorological organisation.

That the method of procedure be to lend instruments and apparatus to persons who, though not necessarily meteorologists, are able and willing to undertake the research, and who have the necessary facilities, either an aeroplane or a ship.

That the Bureau of the Section be instructed to make an appeal to aero-clubs and yacht-clubs to solicit their collaboration in the exploration of the upper air by aeroplane or by ship.

That the Bureau of the Section be entrusted with the necessary apparatus and with the funds required for its despatch to those interested.

That the Bureau be authorised to spend an additional sum of 15,000 francs for the same object in the course of the next three years.

That the Bureau, with a commission consisting of MM. Delcambre, Gamba, and Simpson, be asked to select the regions on land or sea where observations are especially desirable.

Pilot-Balloons.

The sum of 5000 francs is at the disposal of the Executive Committee for the extension of the study of the stratosphere by pilot-balloons in the regions of permanent high pressure, in the desert regions of large continents, and over the equator. It is thought that the best method of procedure is to lend the instruments and to provide the necessary material for persons who are able and willing to assist.

That the Bureau of the Section appeal to the Directors of astronomical and magnetic observatories for their assistance, especially in the matter of personnel.

That, if necessary, the Bureau have the power to requisition additional sums up to 30,000 francs for the same object during the three years which follow the present meeting.

3. *Convection.*

That the Bureau of the Section be instructed to invite the co-operation of *savants* of countries adhering to the Union on questions relating to the details of convection, either by experiments on the ascent of light or warm gas, by observations of convective phenomena in clouds, or by the calculation of the process of ascension from the point of view of the influence of the friction of the environment.

4. *Radiation.*

That the Bureau of the Section be instructed to present a short report on the state of our knowledge of the radiation of the sun, of the sea, and of the air from the point of view of the general circulation of the atmosphere, which may give to the members of the Union information on the loss of heat and consequently on the potential temperature of the different layers of the atmosphere.

That the Section of Meteorology of the International Union take steps to convey to the Ministry of Public Instruction in Italy the wish that the Astronomical Observatory of Naples should be put into condition to continue and develop its researches which have an evident international interest.

The Section of Meteorology of the International Geodetic and Geophysical Union records its appreciation of the excellent work done by the Astrophysical Observatory of the Smithsonian Institution of Washington in determining with a high degree of accuracy the intensity of solar radiation outside the earth's atmosphere. It is of the opinion that the daily values now being obtained at Mt. Montezuma, Chile, and Mt. Haque Hala, New Mexico, will prove of great value in the solution of certain meteorological problems. It therefore expresses the hope that these determinations may be continued for a considerable period of years.

5. *Transparency and Dust.*

The Union of Geodesy and Geophysics allots to the Meteorological Section the sum of 2500 francs for the purchase of a certain number of specimens of the instrument described (jet-apparatus) and its gratuitous distribution to certain observatories selected for the purpose in order that the delegates of other nations adhering to the Union may make observations on this subject and communicate them to the Bureau of the Meteorological Section of the Union.

It has been established in France that certain kinds of clouds produce beneath them haze, sometimes very thick, which may reach to the ground.

On the same subject M. Gamba asks that a comparison be made of the instruments designed for the measurement of the transparency of the air in times of mist and fog.

6. *Hydrogen in the Atmosphere.*

That the Bureau of the Section be instructed to make inquiries as to the steps which are necessary to determine the amount of hydrogen in the atmosphere by analysis in different localities and at different heights, and to draw up, for the next General Assembly, a proposal on the methods of solving the question and their cost.

7. *Forecasting Weather.*

That the Bureau of the Section take steps to obtain from the several countries a reasoned statement of the methods which they employ in the general forecasting of weather.

8. *Forms of Cloud.*

That members of the Union who are interested in questions of the different kinds of clouds be asked to put themselves in communication with the Commission which has been constituted by the International Meteorological Committee for the study of the subject from the point of view of both pure and applied meteorology.

9. *Presentation of Data in Modern Statistical Form.*

The Section of Meteorology, having heard Prof. de Marchi's account and the suggestions put forward by M. Wallén, desires that the International Meteorological Committee should take into consideration the use of modern statistical methods for the calculation of normal values of the meteorological elements, and more especially of rain.

10. *Co-operation with the International Meteorological Organisation.*

In view of the International Conference of Directors of Meteorological and Magnetic Institutes which is to be held in Holland in 1923, this Section is of opinion that the Conference of Directors should be invited to consider whether there is any overlapping between its functions and those of the Union, and to make suggestions for the closest collaboration between the two organisations.

The occasional papers which were read before the Section included : Forecasting by Harmonic Analysis of Barographic Curves (Francesco Vercelli); The Service of Forecasting for Ships in Portugal, and the Use of Observations of Swell on the Portuguese Coast for the Weather Service of Morocco (Admiral Neuparth); The Formation of Hail (Professor Artom).

Such is the bare record of proceedings. Further particulars are given in the Procès-verbaux of the meeting issued from the press of the Lincei, 1922. Let me wander a little into a wider field of speculation.

Looking back across the vista of history, one may remark that among the characteristics of the high and mighty is the devotion of a good deal of time and energy to the art of killing each other, and, when not pre-occupied in that way, the occupation of their leisure hours is killing something else : in either case success is estimated by the bag.

That kind of occupation ought not to be so attractive as finding out how nature manages to integrate her differential equations without hoisting the sign of impossibility or resorting to the Coptic alphabet. But it is a universal form of human enjoyment not altogether unknown to the scientific, reminding one perhaps a little of barbarous ancestry, but even in the twentieth century to be taken as we find it for better or worse.

At Rome we were, I am glad to say, much more concerned with the integrations of natural processes than with making an untimely end of any other form of activity. Perhaps it was that we all went so much in fear for our own lives either as pedestrians or voiturians in the narrow streets of the Eternal City that the appeal of the chase was less insistent than usual ; we had a feeling that the most agile hunter might find himself in his turn on the run, with a bonnet or a mud-guard or a shaft within a few inches of his back.

And yet I think you will find that the mention of the International Union for Geodesy and Geophysics (Meteorological Section) is not altogether without a soupçon of the primeval instinct of humanity. The initial resolution of the Conference of London starts from that point. There have been in the air from time to time suggestions that now that the Academies have taken up the question of scientific research in real earnest the occupation of such creations of the Victorian Age as international assemblies of the directors of institutes and observatories, with no money to dispose of and no powers of coercion, will be gone. It will be noticed that in Rome we were content with asking the next assembly of Directors to review the question of overlapping and making other suggestions of like character.

My belief is that the Academic Union will find the Directors' Conferences an immense assistance in their arduous undertaking. Leaders of meteorological thought will, it is hoped, not be absent from either. The Conferences will only become unnecessary if instead of keeping its attention fixed on research in the rather lofty sense in which I defined it at the outset the Union should subside into the not less useful but much less exalted task of organising observations which are the common duty of the meteorological establishments of the world. That would indeed be the missing of a great opportunity. For a full generation within my own knowledge meteorologists have been reproached for compiling

observations and still more observations. On one occasion the present Secretary of the Research Council himself suggested that the proper programme for meteorology was to suspend observations altogether for five years and devote all the time, energy, and money to discussing the observations. There is no short cut that way. Let me repeat. There are two sides to meteorology; one is the provision of material and the other the inductive and deductive elaboration of the science. The body of workers that provides the one is not, generally speaking, the same body as that which must do the other, if it is to be done at all. You won't help a single meteorologist in London by discouraging observations in Jan Mayen, Baffin's Bay, or the Sahara. The inauguration of the Meteorological Section of the Union opens up a way to removing the old-standing reproach. Let us hope that the academic potentates passing along it may abstain from the sport of exterminating the aborigines who have paved the track for the academic chariot. Let us aim at bringing new encouragement to those who, during their official lifetime, while dealing with the daily requirements of the nations for whom they work, have been striving towards the very objects which the academies have now in view, without the facilities for filling gaps and stimulating research which the Union is fortunate enough to have at its disposal.

Dr. G. C. SIMPSON at the conclusion of the paper said he knew that only the audience present would be able to realise how much of the success of the meeting in Rome was due to Sir Napier Shaw. If he had not been there the meteorological meetings would have fallen absolutely flat; he ran all the meetings and also was his own translator and made the whole thing go with a swing. He appeared to be the only President of the Bureaux who realised the importance of the francs that were going and he spent those at his disposal while the others remained in the bank. There was one thing—what was to be the relationship in the future between the new International Union and the Committee of Directors? He felt there was real advantage in having two organisations and there was no need for any overlapping. The business of the Meteorological Service of a country had become so big and so mixed up with the Government of the country that there was any amount of work for the Committee of Directors if they gave their whole attention to the meteorology of the public services. They need not be affected by this new Committee. There were on the whole few persons in this country outside the Meteorological Office and the Society who were interested in meteorology. There was not the wish to investigate meteorological and scientific problems for their own sakes, as, for instance, in the universities of Germany, where meteorological studies were taken as part of physics, and they had their researches in meteorology as in sound, light, or heat. There was nothing like that in this country. We had to stimulate meteorological interest here for its own sake and not as a way into a well-paid Government department, and this was what the speaker felt about the duties of the two organisations. One more point was that the Society ought to see that they had an *ex officio* member of the National Committee of the Geodetic and Geophysical Union, which is elected by the Royal Society. The Society ran side by side with the Meteorological Office in representing meteorology in this country and he wished it would make sure that the scientific side was kept in view by the whole country.

The PRESIDENT (Dr. C. CHREE) after referring to a few incidents of the meeting at Rome, said he was sure they were much indebted to Sir Napier Shaw for the very lucid statement he had given.