arrows from the point Q_2 (R.A. 7½h., Decl. +58°). It will be convenient to refer to the two systems as Drift I. and Drift II.; Drift I. accordingly is a group of stars in rapid motion from the point Q_1, and Drift II. a group in comparatively slow motion from the point Q_2, its velocity being, in fact, not quite one-third that of Drift I. Fig. 2 also shows that the speed of Drift I. appears smaller in the regions nearest Q_1, and of Drift II. in the regions nearest Q_2. This is because that part of the drift motion which is in the line of sight has no effect on the proper motions, and cannot be detected by examining them. The component of the drift motion *across* the line of sight decreases as the apex of the drift is approached, and vanishes at the apex itself.

Another result from the mathematical analysis is that the stars are nearly equally divided between the two drifts, Drift II. having, perhaps, a slightly greater proportion. It is rather remarkable that although some parts of the sky are more than twice as rich in stars as others, the approximately equal division between the two drifts is maintained in every region.

It is natural to inquire whether there may not be some other distinction between stars of the two drifts besides their motions. The fact that the sun moves comparatively slowly relative to Drift II. rather suggests that the sun belongs to this drift. In that case it might be expected that the Drift II. stars would be nearer on the average than those of Drift I., the latter forming a sort of background. The magnitudes of the proper motions (which have up to this point not been considered) afford data for testing this point. Due allowance having been made for the fact that the true Drift II. motion has already been found to be very much less than that of Drift I., the apparent motions indicate the same mean distance for the two drifts. In fact, a mathematical calculation showed less than 5 per cent. difference between the mean distances of the two drifts (though it is improbable that the data can be trusted quite so far as this). Remembering that the two drifts divide the stars in nearly the same proportion in all the regions, it would seem that they are as completely mixed as it is possible to imagine.

One point of great interest is the distribution of the stars of different spectral types among the drifts. It has been customary to regard Secchi's two types as forming to a certain extent two systems, for Type II. stars are very evenly distributed throughout the sky, whereas those of Type I. tend to congregate in the plane of the Milky Way. It is, however, quite certain that the division into two spectral types and the division into two drifts do not correspond. If we examine Type I. stars alone, both drifts are evident; and so also if Type II. stars are examined alone. Nevertheless there is a systematic difference between the distribution of the proper motions of the Type I. and Type II. stars, which manifests itself in every region examined (including the Bradley stars). It may perhaps be interpreted as being due to a higher percentage of Type II. stars in Drift II. than in Drift I., but it now appears more probable that the difference consists in Type II. stars having larger "peculiar" motions (the haphazard individual motions) than Type I. stars. In addition to some satisfactory direct evidence, this latter explanation is supported by the fact that nearly all the "runaway" stars are of Type II., and it also agrees with the difference in distribution of Type I. and Type II. stars; the former mainly congregate in one plane, whilst the latter, perhaps originally in the same plane, would have become more uniformly distributed in consequence of their greater individual velocities.

There is no indication of any relation between magnitude and drift, except possibly in the case of the very bright stars (brighter than magnitude 4·0). These latter seem to belong principally to Drift I., but they are so few in number (in the area examined) that the result may very well be accidental.

Having determined the motions of the two drifts of stars relative to the sun, and knowing also that the stars are nearly equally divided between them, it is easy to determine the motion of the sun relative to the combined drifts—in fact, to determine the *solar apex*. In this way the solar apex is found to be at R.A. 17h. 45m., Decl. +31°; it is naturally fairly close to Q_1, since the velocity of Drift I. predominates. From the same stars, by Airy's method, Dyson and Thackeray found the solar apex to be at R.A. 18h. 20m., Decl. +37°. The somewhat greater R.A. of their determination (and of most other determinations) is probably the result of using the magnitudes of the proper motions. This position, deduced by means of the two-drift theory from the directions of the proper motions only, has the advantage of being free from all assumptions as to the distances of the stars, but the probable accidental error is large. The two-drift theory further directs attention to the true nature of the "solar motion" so determined; it is in no sense an *absolute* motion, and there is now no justification for confounding it with the motion relative to the æther, as has sometimes been done.

In conclusion, whilst Prof. Kapteyn's theory accounts in a simple manner for the very anomalous and unsymmetrical way in which the directions of motion of the stars are distributed, it is still awaiting the verdict of the spectroscopic determinations of line-of-sight velocities. The material exists in plenty for applying this test; it simply awaits examination by those who have access to it. The investigation of the motions of still fainter stars, and of regions of the sky which have not yet been explored, offers a large field for further research.

A. S. EDDINGTON.

SEVENTH INTERNATIONAL ZOOLOGICAL CONGRESS.

THE arrangements for the seventh International Zoological Congress, which will be held at Boston, August 19–23, under the presidency of Mr. Alexander Agassiz, are now well advanced. The congress will open formally on the afternoon of August 19 in the Harvard Medical School, and arrangements will then be made for the meetings of the sections. The subdivision proposed is rather elaborate, for there are to be sections on general zoology, systematic zoology, experimental zoology, marine zoology, evolution, heredity, and so on. There will be three general meetings; the International Committee on Zoological Nomenclature, under Prof. R. Blanchard, will continue its arduous labours; and numerous addresses, communications, and exhibits have already been arranged for. It need hardly be said that the arrangements for hospitality are generous. On each day of the strict congress week there will be luncheon at the invitation of the Boston local committee, and the evenings will be occupied with receptions and dinners.

On the afternoon of August 22 there will be an excursion to Wellesley College; August 24 will be devoted to a visit to the museums of Harvard University; August 25 is Woods Hole Day; August 26 Columbia University Day; August 27 the American Museum Day. On August 28 the members of the

congress will visit the marine laboratory of the Brooklyn Institute of Arts and Sciences, and the Carnegie station for experimental evolution at Cold Spring Harbour. On August 29 the New York Zoological Society will receive in the morning in the New York Aquarium, and in the afternoon in the Zoological Park; in the evening there will be a reception in Columbia University library.

On Friday, August 30, Prof. Henry Fairfield Osborn invites the congress to an excursion up the Hudson to West Point and Garrison. Saturday will be devoted to the Universities of Yale and Princeton.

On Monday, September 2, the congress will move from New York to Philadelphia; there will be luncheon at the Academy of Natural Sciences, followed by inspection of the library and museum; there will be an afternoon drive to the Zoological Gardens and Fairmount Park; in the evening there will be supper at the Philadelphia Country Club.

On September 3 there will be visits to the American Philosophical Society, Independence Hall, Girard College, the University of Pennsylvania, and thereafter the congress will move on to Washington. On September 4 there will be a general meeting in the assembly hall of the Cosmos Club, Washington, at which addresses of welcome will be given by the secretary of the Smithsonian Institution, the president of the Carnegie Institution, and the president of the Washington Academy of Sciences. This will be followed by a visit to the National Zoological Park, the Congressional Library, the United States Department of Agriculture, the Hygienic Laboratory, and other points of zoological interest. In the evening there will be a reception by the Cosmos Club.

On September 5 the congress will proceed by boat on the Potomac River to Mt. Vernon, the home of George Washington, and to the United States Navy Proving Station at Indian Head. There will be dinner at Marshall Hall, and an evening reception at the United States National Museum.

On Saturday, September 7, an excursion has been arranged to Niagara Falls and across Lake Ontario to Toronto, returning to New York on Monday night or Tuesday morning.

If fifty members agree to go, there will be an excursion to Bermuda, which will give the members of the congress an opportunity of becoming acquainted with a very interesting semitropical zoological region. Members will have facilities in collecting and preserving zoological material. The expenses of the expedition for each participating member will be thirty-two dollars for return passage and about two dollars a day hotel charges while in Bermuda. After the party lands in Bermuda, the local committee will supply, free of charge, all transportation, carriages, steamers, &c., and such other incidentals as will ensure a successful expedition. It is to be hoped that this very attractive part of the programme will be carried out. The inclusive dates fixed for the expedition are September 14–22.

It may be noted that the executive committee of the Boston meeting consists of Profs. G. H. Parker (chairman), Samuel Henshaw (secretary), L. O. Howard, J. S. Kingsley, E. L. Mark, and H. F. Osborn.

If two suggestions from experience might be ventured, we would submit that outside each sectional meeting there should be a time-table board showing what precisely is going on, and that each member should wear in his button-hole a number corresponding to a printed list, so that strangers to one another may know at once who's who!

THE LEICESTER MEETING OF THE BRITISH ASSOCIATION.

PROVISIONAL PROGRAMMES OF SECTIONS.

ARRANGEMENTS for the work of the various sections are now approaching completion, and we are able to give the provisional programmes. It is evident from this list of papers and discussions, incomplete though it is, that many matters of wide scientific interest will be brought forward at Leicester.

Among the foreign representatives who have accepted invitations to be present are the following:—Section A.: Prof. L. Natanson, Prof. D. J. Korteweg, Prof. H. G. van de Sande Bakhuyzen, Dr. Oskar Backlund, Prof. Donner, M. Ch. Féry; Section B.: Prof. R. Abegg, Prof. A. Tschitschibabin, Prof. T. W. Richards, Prof. A. Werner, Prof. F. M. Jaeger; Section C.: Prof. H. Sjögren, Prof. F. Frech, Prof. C. Diener, Prof. J. P. Iddings; Section D.: Prof. H. Simroth; Section E.: Prof. P. Vidal de la Blache, Prof. Max Eckert; Section H.: Prof. E. Naville; Section I.: Prof. N. Zuntz; Section K.: Prof. J. P. Lotsy, Prof. R. Chodat, Prof. H. Conwentz, Prof. O. Uhlworm; Section L.: Dr. Otto Anderssen, Dr. F. Rönning, Prof. M. L. Morel. Corresponding members Baron D. Kikuchi, Prof. P. H. Schoute, Prof. R. Nasini, and Prof. George F. Barker have also expressed their intention of being present.

The address of Prof. A. E. H. Love, F.R.S., the president of Section A (Mathematical and Physical Science), will be delivered on the morning of Thursday, August 1. Several discussions have been arranged. On Friday, August 2, there is to be one on the constitution of the atom, which will be opened by Prof. E. Rutherford, who will be followed by Sir O. Lodge, Mr. G. A. Schott, and others. On Monday, August 5, Dr. L. Holborn, of Charlottenburg, will open a discussion on radiation-pyrometry; he will be followed by M. C. Fery, of Paris. On August 6, a paper by Mr. W. Palin Elderton on modern methods of treating observations will consist of an exposition of the methods of Prof. Karl Pearson, chiefly as applied to meteorological phenomena. It is hoped that all will attend who are interested in the reduction of observations of any kind, and assist to make the discussion useful. The following papers have also been promised:—On the nature of ionisation, Prof. H. E. Armstrong; an analytical study of the meteorological observations made at the Glossop Moor kite station during 1906-7, Miss M. White, Mr. T. V. Pring, and Dr. J. E. Petavel; recent developments of the methods of forecasting by means of synoptic charts, Dr. W. N. Shaw; ether density, Sir O. Lodge; sæcular stability, Prof. H. Lamb; modern work on the calculus of variations, Prof. A. R. Forsyth; exhibition of models of three-dimensional sections of the regular hypersolids in space of four dimensions, Mrs. Stott; a method of obtaining the chief properties of the exponential function, Prof. A. E. H. Love; operational invariants, Major MacMahon; a property of Abelian groups, Mr. Harold Hilton; factorisation of the Pellian terms, Lt.-Col. Cunningham; on the theory of integral equations, Mr. H. Bateman; a mountain observatory in India, Prof. C. Michie Smith. The various committees connected with the section will also present their annual reports

Section B (Chemistry) has made the following provisional arrangements:—August 1: Presidential address, Prof. A. Smithells; discussion on valency, to be opened by Prof. W. J. Pope, and in which Prof. Werner (Zürich), Prof. Abegg (Breslau), Prof. Richards (Harvard), Prof. Jaeger (Amsterdam), Prof. J. J. Thomson, Mr. W. Barlow, and others will take part. August 2: Joint discussion with Section G on explosion tempera-