race, which grew up under the cloudy skies and cold raw climate of the shores of the North Sea in post-glacial times. The members of this race had to develop boldness and perseverance to survive at all, and they won their food as a result of terrific struggles with the elements, and to this struggle they owe their good and forceful qualities. Dr. Fantham points out that hybrids between the two races lose the admirable qualities of the white and yet are not controlled by the tribal conventions of the negro. Further, as children of the same family differ in the colour of their skins, the whiter consider themselves European and despise their darker brothers and sisters as negroes. Dr. Fantham traced one such hybrid family through five generations. A joint meeting of the Eugenic and Anthropological Societies of London was told last spring that miscegenation was far more widespread than one would gather from Dr. Fantham's papers, and was slowly undermining the moral stamina of the whole of the white population of South Africa. What are known as 'coloured people,' that is, hybrids of the second and third generation, are increasing in number, and the whiter individuals are intermarrying freely with the pure white population. We can only say that we trust that this view is an exaggerated one.

Dr. Fantham alludes to another matter of great importance, namely, the exhausting and weakening results of too frequent pregnancies not only on the mother but also on the children. We ourselves believe that the most fertile cause of human 'mutations' is to be found here. Dr. Fantham gives an example of the results of such pregnancies traced through three generations. In all three 'Mongolian idiots' appeared; this defect appears to be due to amniotic pressure on the developing brain.

Dr. Fantham's final conclusion is one which we can heartily endorse; it is that "the principles of animal [including human] biology put forward in simple interesting language and illustrated by living examples should form an essential short course in the curriculum of every University student as well as of every school child." This proposal has been pressed on our own Ministry of Education by the Council of the Eugenics Education Society, and when population and cognate problems in Great Britain become sufficiently acute to cause widespread discomfort, it will doubtless be given official attention. E. W. M.

Research in Illumination.

A SURVEY of the work of the Illumination Research Committee of the Department of Scientific and Industrial Research is given in a report issued recently by the Department. These investigations were also reviewed in a paper read by Mr. J. W. T. Walsh before the Illuminating Engineering Society on June 1. In the introduction to the Report the events leading to the formation of this committee are recalled, and attention is directed to the demand for information on lighting matters that has arisen since the formation of the Illuminating Engineering Society in 1909. On the Illumination Research Committee the medical and architectural professions are represented, and there are several members who are experts on illumination and also members of the Illuminating Engineering Society, the various British Engineering Standards Association committees, and other bodies concerned in research on illumination. Co-ordination of effort is thus facilitated and overlapping of work avoided.

The representation of the Medical Research Council on the committee is of special importance, as numerous problems before the committee have a physiological basis. This applies particularly to the study of glare,' and of the relation between intensity of illumination and speed and accuracy of fine work. Such fundamental researches necessarily require time. In connexion with the second problem, attention has first been devoted to printing as an example of fine work' readily adapted to investigations of relations between illumination and output. In this investigation valuable aid has been rendered by the Joint Industrial Council for the Printing Trades of the United Kingdom. The results are to be presented in a detailed report, but it appears that the relation between illumination and quality of work has been fully substantiated. This investigation will be extended to other forms of 'fine work.'

Other fundamental researches include a comprehensive record of daylight-intensities, now being made at the National Physical Laboratory, Teddington.

Among the 'special problems of urgency' may be mentioned the investigations of enamelled iron reflectors, which have contributed greatly to the framing of the recent British Engineering Standards Association's specification for reflectors used in industrial lighting. The design of picture galleries with the view of the avoidance of troublesome reflections in the glazed surfaces of pictures has also been studied. Another series of researches deals with the effect of flickering illumination on vision and the brightness of glassware used in various lighting fittings (the latter another problem with which a B.E.S.A. committee is concerned). A series of experiments is in progress with the object of studying the effect of colour and distribution on the degree of comfortable illumination required for clerical work. The systems examined include: (*a*) Semi-indirect lighting with vacuum lamps; (*b*) Semi-indirect lighting with artificial daylight (blue bulb) lamps; (*c*) Artificial window lighting with vacuum lamps; and (*d*) Artificial window lighting with artificial daylight lamps. Numerous other investigations include the examination of transmission of light through window-glass, the effect of window size and the reflecting power of walls and ceilings, the relation between glare and visibility in street lighting, and the distribution of temperature in the glass and other parts of lighting fittings.

Mr. Walsh, in the concluding portion of his paper, mentioned that these investigations would be the subject of individual reports, to be issued by the Department in the near future. At the meeting on June 1, general recognition of the importance of the work being done by the committee was expressed. Mr. C. C. Paterson (chairman of the Illumination Research Committee), in opening the discussion, alluded to the services rendered by the Illuminating Engineering Society and its hon. secretary (Mr. L. Gaster) in paving the way for the creation of the committee and initiating these researches. Sir John Herbert Parsons, who presided, emphasised the important field presented for physiological study by artificial lighting, and commended the subject to the notice of ophthalmologists. Miss Wiggins mentioned examples of the valuable aid which the committee has rendered to the British Engineering Standards Association in connexion with its various investigations. Mr. J. S. Dow, in commenting on the relation between illumination and ease of work, pointed out that discretion is necessary in attempting to derive standards on the basis of natural illumination, and suggested that investigations should be directed to the effect on vision of the differences in the spectra of artificial illuminants and daylight. Mr. W. C.

Raffé suggested various inquiries bearing on the effect of colour, and the influence of light on certain metals. Mr. A. Cunnington referred to problems arising in connexion with the passage of railway trains through short tunnels, as illustrating the liability of temporary dazzling of the eyes to cause accidents. Mr. P. J. Waldram discussed the problem of avoiding troublesome reflections in picture galleries, referring particularly to the effect of badly placed skylights.

At the end of the discussion Mr. L. Gaster explained the interlinking of the Illumination Research Committee with the various other organisations interested in research on illumination, and pointed out that the Illuminating Engineering Society is performing valuable service by acting as a 'liaison officer' and as a clearing-house for information. The recent discussion before the Society of the specifications of the various B.E.S.A. committees (see NATURE, March 13, p. 397) proved valuable in making them more widely known, and it is hoped that the discussion of this preliminary report of the Illumination Research Committee would be equally useful. It is of obvious importance that reports of such work should receive the widest publicity and should be thoroughly discussed, and he hoped that the forthcoming reports on individual researches would be likewise presented at meetings of the Society for full consideration.

Primitive Time Reckoning and the Calendar.

THE stages by which the Julian calendar as a method of time reckoning was attained are demonstrated by Dr. Martin P. Nilsson in a contribution to vol. 39, pt. 6 of *Scientia*, which surveys the various methods of measuring time employed by primitive and early peoples, and shows how the conception of a continuum in time, which is the essence of a calendar, has gradually developed.

The mind of primitive man, being essentially interested in the concrete, expresses time in terms of action, such as the time it takes to cook a bowl of rice, or the duration of a journey, the double hour of the Babylonians being an example of the latter. In the early stages certain recurrent natural phenomena are regarded, not as units of time of a certain duration, but as indications of time. The conception of continuity is absent at this stage. Thus time of day is indicated by the natural divisions—dawn, twilight, sunrise, or the position of the sun. Night is regarded as a whole. The crow of the cock is employed generally, but few make use of the stars as did the South American Indians and the Homeric Greeks. The conception of a 24 hours' day is late.

In the same way, the season of the year is indicated by natural phenomena, winter, summer, the season of snow, rain, drought. Neither the duration of the season nor, more remarkable, their number, is uniform. While we have four seasons, other peoples have two, three, five, or six. The unity of the year is established only slowly, and that empirically. As among the Banyankole, the reckoning may be from rains to rains. An agricultural people employs the agricultural operations, reckoning from sowing to harvest, the vacant period following the latter not counting.

The year is recorded and identified by some striking happening such as the "year of the meteorites." The Roman method of identifying it by the Consuls is another example.

The observation of the stars and constellations, and especially their heliacal rising, gives a more exact method of time reckoning. These observations are brought into relation with agricultural operations. This leads to the observation of the solar year, which in Egypt was fixed so far back as the prehistoric period through observation of the heliacal rising of Sirius; but the conception of units of time and time as a continuum arose from observation of the moon's phases, which gave the lunar month and the divisions of the lunar month as a record of time within the month. These months were named from the appropriate activities or natural phenomena. Owing to the disparity of the lunar month and the solar year in this luni-solar year, which was known to the Greeks, Babylonians, and Jews, it became necessary, whether the cycle consisted of 12 or 13 lunar months, to employ the principle of inter- or extra-calation, either at irregular intervals or periodically, as was done in Greece in the 7th century B.C. It was this last type of calendar which was superseded by Cæsar's reform, which based the Julian calendar solely on the solar year, recognising the impossibility of equating it with the lunar year.

The Need for Precision in Botanical Terminology.

IN his presidential address to the Linnean Society on May 27, Dr. A. B. Rendle referred to the work of the Society during the year. An interesting feature of certain of the discussions has been the tendency to get back to first principles or definitions and to discover that that which we had regarded as definite is after all vague. For example, in one of the discussions various authorities were quoted in support of different ideas as to the conception of the term carpel. Morphological terms originate in a desire to express certain conceptions, limited or general, and morphologists are apt to find themselves in the same position as the present-day systematist in typifying species. In the matter of definitions a meaning may be attached to a term which the originator never meant to convey; moreover, a vague use of terms may engender vague ideas of relationship. The advisability of the inclusion of the seed-like organs of Pteridosperms under the definition of seeds was also questioned. What is the degree of importance of the differences between the modern seed, which has priority for the use of the term, and the organ characteristic of Pteridosperms? Has the latter advanced beyond the gametophyte stage? Does the fact that postponement of embryo-formation until after the freeing of the seed occurs, for example in Cycads, meet the objection? This absence of an embryo may be called negative evidence; but is it not rather the absence of the criterion of the normal seed, which is an arrangement for the protection of the new sporophyte during a period of rest or transport? The phases in the life-history preceding and accompanying germination must have been widely different in the two great groups.

Until the Caytoniales were described we were clear as to what we understood by Angiosperms. We know nothing of the contents of the seed-like bodies in this primitive group, but we recognise the Angiosperm idea and associated with it the generally considered advanced character of wind-pollination.

Are we clear as to our ideas of what constitutes a Gymnosperm? The tendency is to include here