

I should accordingly like to ask Mr. Galton whether he would indicate what, in his opinion, are the chief considerations to be taken into account in giving preference to the mean or the median as the better measure of the "average"? It is a point upon which there is considerable difference of opinion; the recognition of the median is rapidly extending, and some statisticians incline to think that there is a growing tendency to quote it in cases where the ordinary arithmetic mean is preferable.

March 16.

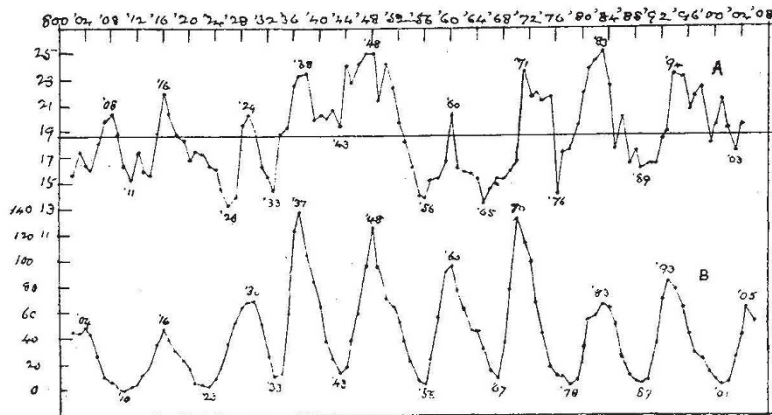
R. H. HOOKER.

Rothsay Rainfall and the Sun-spot Cycle.

THE rainfall of Scotland has been thought to show, in its variations, an influence of the sun-spot cycle of eleven years (in the sense of most rain about maxima). Evidence of this was furnished not long ago by one of our ablest meteorologists, Dr. Buchan, in a paper to the Scottish Meteorological Society (Journal, 3 ser., Nos. xviii.-xix., p. 117).

For such an inquiry the record of Rothsay, in Bute, is singularly valuable, extending back as it does to the year 1800 in unbroken series.

The relation to the sun-spot cycle may be traced, I think, not only in the total annual rainfall of Rothsay, but also, with more or less distinctness, in the amounts for certain sections of the year, and even individual months.



A, Rainfall July, Rothsay, 1800-1906; smoothed with sums of five; B, sun-spot curve.

Thus it is met with in the rainfall of summer, and especially that of July.

I have prepared a curve of the July rainfall (A), in which, by a familiar method, each year-point represents the rainfall of five contiguous Julys (i.e. 1800-4, 1801-5, and so on). Below is the sun-spot curve (B). The amount of correspondence between these two seems remarkable, and not easily explained by fortuitous coincidence.

ALEX. B. MACDOWALL.

The Relationship between Diamonds and Garnets.

IN an able paper entitled "The Diamond Pipes and Fissures of South Africa," read before the Geological Society of South Africa rather more than a year ago, Mr. H. S. Harger refers more than once to the significance of the fact that diamonds have been found embedded in garnets. Perhaps the fact that the converse is also true, namely, that the garnet sometimes occurs embedded in the diamond, may not be without its share of interest. I have here at the present time a fragment of a Wesselton diamond, weighing a little more than a carat, containing a small, irregular garnet of about one-tenth of a carat. Originally the fragment seems to have formed a part of a shapeless diamond of perhaps two carats, which evidently enclosed either two or three small garnets, or garnets and diamonds.

J. R. SUTTON.

Kimberley, South Africa, February 20.

THE WEATHER REPORTS OF THE METEOROLOGICAL OFFICE.

THE commencement of the new year was marked by the introduction of a number of changes in the weather reports of the Meteorological Office.

Two notable events have contributed to bring about modifications in the daily report. Arrangements have been made for regular telegraphic reports from Iceland, and for occasional reports by wireless telegraphy from the ships of the Navy.

Thanks to the Danish Government and the Great Northern Telegraph Company, the cable to Faeroe and Iceland, long desired by meteorologists and fishery associations, was laid in the summer of last year. There is a touch of sadness in the reflection that Adam Paulsen, director of the Danish Institute, who led the way so assiduously towards this meteorological Canaan, only got a distant view of the promised land. In August, 1906, he issued a circular on behalf of the Danish Government, defining the terms of subscription for the service of meteorological telegrams from Iceland, but, as already reported in NATURE, he died before the arrangements were completed.

Reports from Thorshavn in Faeroe and from Seydisfjord, on the east coast of Iceland, have been received in London, in a provisional way, since the end of October, but the meteorological telegrams from Reykjavik, on the west coast, commenced on Friday, February 15, as part of the full system which includes messages from Blönduos and Akureyri, where the land line touches the northern fjords, and Grimstadir, between the last-named place and Seydisfjord, where the cable lands. The meteorological arrangements are not complete even yet, for the reports do not conform to the established international model, either in uniformity of the hour of observation or the extent of the information transmitted; but those who have seen what the new information means for the weather

map of north-western Europe, what light it throws upon the meteorological situation of the northern Atlantic, will appreciate the satisfaction that is felt with the result of the negotiations even in their present stage. Paulsen has indeed carved for himself a memorial *aere perennius* upon the winds and weather of the stormy northern island.

It is to the Lords of H.M. Treasury that we owe the realisation of this long-cherished project so far as this country is concerned. It need hardly be said that the cost of the new service is very considerable. Their lordships have undertaken to ask Parliament to increase the grant for meteorology from 15,300l., the figure at which it has stood since 1882-3, by 200l., and the greater part of our share of the expenses for Iceland telegrams is thus provided for.

In order that the new information may be incorporated in the daily weather report the area of the charts has been extended to a more western longitude than hitherto, and the occasion has been utilised also to take in an area as far south as Gibraltar, and to meet a wish, often expressed, that a barometric chart of the 6 p.m. observations of the previous evening should be given. This appears as an inset chart on the same scale as "yesterday's" 8 a.m. chart for the whole of Europe, side by side with the 8 a.m. chart for "to-day." But six o'clock observations

are only received by telegram from western Europe, and the eastern portion of the map would always be blank. Advantage is taken of this misfortune to get a western extension of the lower part of the 8 a.m. barometric chart, and thus provide for the observation from the Azores, for which we are indebted to Major Chaves and the Portuguese Government. It happens that the eastern point of the Azores and the western point of Iceland lie close to the meridian of 25° W. and it is a matter of importance to get observations from both these "centres of action" on the same chart. The bringing of Iceland into touch with Europe by the new telegrams emphasises the isolation of the Azores, and the chart is a pathetic appeal for the extension of the area to be reached by wireless telegraphy. But in the meantime the daily problem of drawing isobaric lines to connect the Azores pressure readings with the European and North Atlantic distribution affords an intellectual exercise which would bear comparison with some subjects of competition judged worthy of valuable prizes.

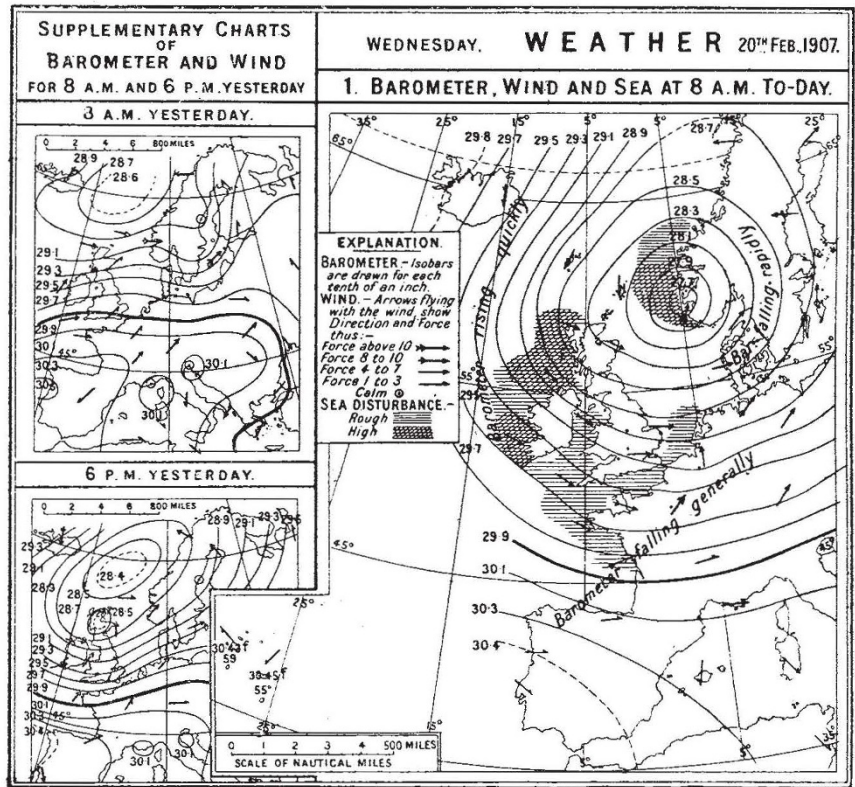
In order to represent the new arrangement of p. 2, the barometric charts for the issue of February 20 have been reproduced, completed for observations missing on the day. They show the development of the storm which caused the *Berlin* disaster at 6 a.m. on February 21.

The extensions of the daily charts have been carried out without sacrificing any of the information hitherto given on the inner pages of the daily report, except the map of weekly results which has occupied a place on p. 2 for some years. On p. 4 the table of hours of observation has gone to make space for wireless telegrams, for which arrangements have been made through the courtesy of the Lords of the Admiralty. Only two messages have appeared as yet, but they have been enough to show that the system, which needs careful organisation in order to avoid disastrous results arising from instrumental or telegraphic errors, is capable of satisfactory working.

The weekly report has been enlarged by two additional pages. The new features introduced last year have been continued. They include temperatures on the grass and in the ground, from a considerable number of stations, and observations in the upper air contributed by Mr. W. H. Dines from his new station at Pyrton Hill, Oxon., Mr. C. J. P. Cave of Ditcham Park, Mr. S. H. R. Salmon of Brighton, and Mr. J. E. Petavel, for the physical laboratory of the University of Manchester, working at Glossop Moor. To these have now been added a table of temperatures of the sea, at coastguard stations and elsewhere on all coasts. No one doubts the influence of the sea temperature upon the climate of this country, but few attempts have been made to deal

with the numerical results. The tracing of the relation of sea temperature to the incidence of sea fog is the direct object of the new departure in obtaining the readings weekly instead of monthly as hitherto.

But the most important addition to the report, although it makes little show, is on the new front page. It is the first result of an attempt to deal with climatological work from the point of view of frequency distribution. The weather of the week for each of the twelve districts of the British Isles as regards warmth, rainfall, and duration of sunshine is characterised by a selection of adjectives for each element. To do this the results for the current week have to be referred to the mean values for the corresponding week which are smoothed to give appropriate averages "for the time of year." The trouble is to define the characteristics of a week in such a way that when the weeks of a particular kind



Form of the new Daily Weather Report of the Meteorological Office.

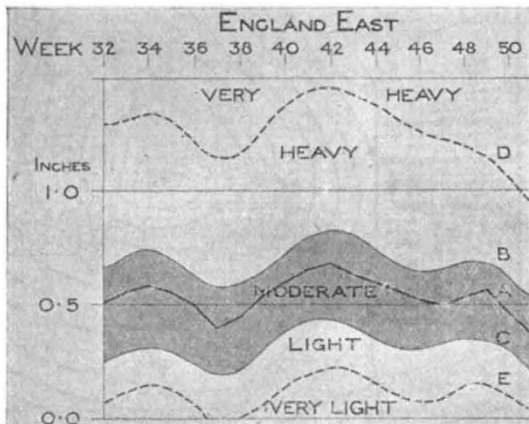
come to be counted for a season or a year, the result shall not be misleading. This seems at first sight an easy matter, but the frequency distribution of the values of the elements introduces a difficulty that is curious and interesting.

Take as an example the rainfall in a district like that of the eastern counties. The mean value for the week is by no means the most frequent value. The commonest kind of week is one with very little rainfall and the frequency of weekly falls of successive intensities is less and less until we come to rare weeks of very heavy rainfall. The mean rainfall belongs to a group which is comparatively infrequent. Consequently, if we call a week with less than average rainfall a dry week, and it seems at first sight reasonable to do so, we shall find that in an ordinary season most of the weeks appear as dry

ones, and they are balanced by the heavy rainfall of a few wet weeks.

Thus in characterising weeks for counting it is necessary to deal with probable frequency of occurrence as well as with the relation of the week's fall to the average depth of rain. Frequency results are most easily expressed by odds. It has been sought to determine limits for a week of so-called "heavy" rainfall, so that the odds are two to one against its occurrence, and the same for "light" rainfall. Further, "very heavy" rainfall has been so defined that the odds are eleven to one against its occurrence, and "very light" in a similar way.

To determine the limits for these odds the weekly values for the twelve districts for the twenty-five years 1881 to 1905 have been dealt with. Smoothed mean values for each week have been obtained, and frequency results for groups of six or seven weeks, to get a sufficiently large combination of values to make the odds a reasonable representation of the probabilities of the case. Limits are then chosen so that, of the whole number of rainfall values for a group of weeks, one-third are moderate, one-third heavy, one-twelfth very heavy, one-third light, one-twelfth very light. Sunshine and accumulated tem-



Classification of Weekly Rainfall.—Portion of diagram for the District "England East" for the period from the 32nd to the 51st week. The line A is the smoothed 25 year average of the weekly rainfall. If the rainfall for any week fall within the central shaded belt, it is characterised as "moderate"; if it fall outside this belt it is either "heavy" or "light"; if it fall above the dotted line D or below the dotted line E, the word "very" is prefixed to the designation. The limits are so adjusted that $\frac{1}{3}$ of the values for the 25 years 1881-1905 fall below the line C, $\frac{1}{3}$ between the lines B and C, and $\frac{1}{3}$ above the line B. One-twelfth of the values fall above or below each of the limits D and E.

perature above and below 42° are treated similarly. The adjectives selected for sunshine are "abundant" and "scanty," and for warmth "unusual" and "deficient."

The work necessary for obtaining these limits has been very heavy, but incidentally a number of interesting points about the weekly values for the elements in the several districts and the frequency distributions have been disclosed which will be the subject of an official publication on the seasons in the British Isles.

The monthly report which began with the January number, issued at the end of February, shows less change than was anticipated at one time. Negotiations were initiated with the view of making it a complete index of climatological work for the British Isles, to contain a line of data for each station contributing observations to the Meteorological Office, the Royal Meteorological Society, and the Scottish Meteorological Society. At present the three bodies collect and publish observations independently; but if a joint publication could

be arranged, any person requiring climatological data would be able, by reference to a single publication, to know what information was in existence and where it was to be obtained. Unfortunately difficulties arose which could not be overcome in time, and as regards climatology the Report for 1907 is limited to the 170 stations in direct or indirect connection with the office. But Dr. H. R. Mill, the director of the British Rainfall Organisation, has expressed his willingness to contribute a rainfall map of isohyetal lines based on the monthly results for about 500 stations in the British Isles, and in the current issue this replaces the map showing rainfall values at the 170 stations which have always been regarded as too few for drawing isohyetal lines.

It ought, perhaps, to be added, as regards the daily weather report, that it is prepared and printed at the public expense, and is sent free to anyone who pays the cost of postage, wrappers, and addressing. Complaint has sometimes been made that it is not advertised as it should be, but as a matter of fact the "advertisable interest" rests with the Post Office. For the weekly report, with which the monthly is included, a subscription is charged to meet the cost of printing. But this report gives so compendious a statement of the weather in the British Isles, daily, weekly, monthly, quarterly, annual, and average, in an annual volume of about 450 pages, that it ought to find a place in every reference library. It has now been in existence for more than twenty-five years, and its value as a homogeneous body of statistics increases with every additional year. Its weekly pages are too much like pemmican to be attractive to the general reader; but a disturbing reflection about the matter is that when its life has continued for fifty years, and the public becomes educated to appreciate its uses, there will be no means of meeting demands for the numbers which are now regarded as being merely of interest to the curious meteorologist.

TECHNICAL TERMINOLOGY.

AN interesting feature of the progress of engineering science has been the gradual formation of the engineering vocabulary. Ever since the days of the early constructors there has been a steady application of fresh terms to technical practice, and it is not difficult to trace the methods by which this has taken place. But the process has operated to such an extent that what could almost be called a new language has arisen, and specimens could be quoted from the best examples of engineering literature which to scholars of a century ago would convey no meaning, though the origin of each individual term might be at once apparent to them.

Some of these terms have interesting histories by reason of the changes of sense they have passed through. The word "skid," for example, was originally the name of the buffer rope hung over a boat's side to protect it from injury. It was then applied to the shoe placed under a wheel to brake the motion of a carriage, and finally it was turned into a verb to express the vagaries of vehicles in muddy weather. "Switch," first applied in railway practice and connected with the peculiar motion of the bar so named, was passed on to electrical machinery. The "salamander" is a newt of a kind supposed, according to an old legend, to be capable of living in fire. The newt, surrounded by his flames, is sometimes seen in heraldry, and from this source it was applied to certain kinds of foundry irons and crucibles. "Splay" is borrowed from architecture, and in its original sense means an obliquity or bevel edge. The bevel edge is frequently used to expose some interior part, and hence the