establish with some degree of accuracy at what temperature working has been carried out and what ranges and durations of annealing have been employed. For this purpose he makes use of measurements of grain-size, of a classification of the degree of "coring" or of "homgenisation" which has been produced, and also of the various indications of cold work or overstrain. Quite apart from its archæological interest, the paper represents a valuable study of the behaviour of the tin-copper alloys ranging in tin-content from about 2 to 14 per cent. under mechanical deformation and annealing. Less happy are the author's excursions into the domain of theories of plastic strain and of annealing in metals generally; they burden a lengthy paper with much additional matter scarcely relevant to the subject.

From the Scientific Materials Co., of Pittsburgh, U.S.A., we have received pamphlets descriptive of the Simatco apparatus for the determination of transformation or critical points in iron, steel, or alloys, and of appliances for general metallographic work. While it is difficult to form any real opinion on such appliances without having seen them and tested them in actual use, the fact that special apparatus of this kind is now being placed upon the market in America is significant of the widespread development and application of metallography. So far as can be gathered from the very clear descriptions and illustrations of the apparatus given in the pamphlets, much of it appears to be highly convenient and ingenious; on the other hand, certain features are obviously open to serious criticism. For instance, the claim is made that a very simple form of well-lagged electrically-wound furnace can by means of a special rheostat be caused to give a uniform rate of rise and fall of temperature over a wide range, and it seems most unlikely that this can be realised. The form of specimen adopted is also open to objection on the ground that much of the metal is further away from the thermo-couple than is necessary or permissible. The shape adopted arises from the use of a leading-in tube of special shape—in itself very convenient—by which the wires of the thermo-couples are brought into the specimen. This shape of tube, however, demands a very wide hole, and the effort to compensate for this by a "deep immersion" results in an unsatisfactory shape. Further, for indicating the temperatures of the thermo-junctions, both for inverse rate and for differential curves, nothing better is provided than a galvanometer with a pointer moving over an ordinary scale. The entire apparatus thus appears to be suitable only for work of the less delicate or accurate kind, which, however, is of very considerable importance in works practice.

PROBLEMS OF CORAL REEFS.

RECENT work on coral reefs has established firmly the part played by submergence in the production of encircling and barrier reefs. At the same time, such reefs are shown to be based on extensive platforms, from which there is a further descent to oceanic waters. Mr. T. W. Vaughan points out (*Amer. Journ. of Science*, vol. xli., 1916, p. 134) that the banks off Newfoundland, Nova Scotia, and Cape Cod "would furnish proper habitats for reef-building corals did they not lie outside the life-zone of such organisms," while the corresponding plateaus of Florida and the Central American coast support many reefs. He attributes the general overflowing of the marginal land areas in recent geological time to "some diastrophic change in the earth," and is unwilling to accept Glacial control as accounting for all the facts. His paper is an introduction to one on the "Relations of Coral Reefs to Crust Movements in the Fiji Islands," by E. C. Andrews, of Sydney (*ibid.*, p. 135), in which submergence is regarded as essential to the formation of the Great Barrier Reef of Queensland, while the barrier reefs of the Fijis are reviewed as narrow growths rising from land areas that have been recently submerged. Prof. R. A. Daly follows (*ibid.*, p. 153) with a paper on "Problems of the Pacific Islands," and emphasises the presence of platforms one or two miles to one hundred miles in width as bases for the growth of reefs. He also considers the case of Queensland, and the numerous sections given, drawn to scale, are an important contribution to geography. "The problem of the coral reef," he concludes, "is, in essence, the problem of the platform." Mr. T. W. Vaughan, in the Journal of the Washington Academy of Sciences, vol. vi., 1916, p. 53, describes the association of platforms and reefs in the Virgin and Leeward Islands, where the platforms were moulded by marine erosion during Pleistocene time and then submerged, the changes of sea-level thus according with Daly's theory of Glacial control. Readers of NATURE will remember a recent consideration of this theory (vol. xcvii., p. 191).

G. A. J. C.

SPECTRA IN ELECTRIC FIELDS.

SHORTLY after Stark's discovery that certain spectral lines could be split up into two or more components by an electrical field, an account was given in NATURE (May 14, 1914, vol xciii., p. 280), under the title "An Electrical Analogy of the Zeemann Effect," of the experiments of the Italian physicist, Lo Surdo, upon the Balmer series. It was shown by Lo Surdo that the resolution of the four lines in the visible spectrum followed some remarkably simple laws. In a paper, dated December 19, 1915, in the *Rendiconti della R. Accademia dei Lincei*, C. Sonaglia shows that Lo Surdo's laws hold for the first line in the ultra-violet, *i.e.* the fifth of the Balmer series. The total number of components into which the line can be resolved is seven, corresponding to the value of the parameter n in the Balmer formula which gives the line, and the number of components the vibrations of which are perpendicular to the field is five, equal to the number which gives the position of the line in the series.

In the same volume, No. xxiv., are two papers by Rita Brunetti, which detail the results obtained on the helium spectrum by Lo Surdo's method. In the third subsidiary series, in which four lines have been examined, it is found that the number of components into which a line can be resolved is again equal to the value of the parameter n giving the position of the line in the series. For each line there are three unpolarised components, while the number of polarised components is equal to $(n-3)$. In the first subsidiary series only the first member, for which $n=3$, possesses any polarised component; for all the lines of this series the number of unpolarised components of any line is $(n-2)$. It is interesting to notice, when British science is so much under discussion, that the optical apparatus used in all these researches was supplied by an English firm.

We have also received vol. xxiv., 96 pp., of *Atti della fondazione scientifica Cagnola dalla sua Istituzione in Poi*, containing a report by Prof. G. Vanni on the progress and present position of wireless telegraphy and telephony. For choice of material, lucidity, and an interesting style this little volume would be difficult to beat. The literature is brought up to about the end of 1914.

R. S. W.