about 1700, but growing for market purposes was not seriously taken up for another century, after which the need for improved varieties soon arose. A new era was ushered in in 1834 by the introduction of the Hovey strawberry, which was the first named variety to be produced by definite plant breeding in North America. From this time the development of commercial cultivation was rapid, and it was accentuated by the competition due to increased facilities for transporting the fragile berries over longer distances. The tenderness of the fruit necessitated a search for the ideal package for marketing, and many descriptions of punnets, boxes, tubs, and trays have been exploited.

The survey includes an outline of observations and experiments on the crossing of species and the raising of new varieties. The illustrated account of present-day methods of breeding and selection gives a useful summary of the subject, and the sketches of abnormal freak berries are of interest to the morphologist. The biographical notices in the last chapter form a fitting conclusion to the book by directing attention to the men to whose careful and patient work is due the great improvement in the strawberry in North America.

The Journal of the Institute of Metals. No. 2. 1918. Vol. xx. Edited by G. Shaw Scott, secretary. Pp. xi+382. (London: Published by the Institute of Metals, 1918.) Price 21*s.* net.

THE twentieth volume of this valuable publication contains a variety of papers of scientific and technical interest. The May lecture, by Sir Charles Parsons, describes the experiments on the artificial production of diamond made by the lecturer during the last thirty years, and discusses the bearing of the results obtained on the problem of the origin of natural diamonds. A group of papers deals with the grain growth of metals, Dr. Zay Jeffries giving a review of the whole subject, and making much use of experiments with tungsten filaments. The observations are by no means easy to interpret, and some of the conclusions appear to contradict one another; but the author has made a most important contribution to a subject of great interest, and it may be possible shortly to bring the facts into harmony. Mr. D. Hanson, in a short note, describes experiments on the same problem, discussing the relation between the rapidity of grain growth at a given temperature and the amount of deformation to which the material has been previously subjected.

A third paper, by Mr. R. J. Anderson, describes the effect of short exposures to various temperatures on cold-rolled aluminium sheet, and although it is the hardness in this case, and not the grain size, which is measured, the phenomena involved are essentially similar to those discussed in the preceding papers. Prof. Edwards gives an account of the method of determining hardness by measuring the resistance to penetration under impact, and there are several contributions on the subject of commercial copper alloys. An interesting communication by Mr. W. E. Alkins records the effect of progressive cold work on the tensile properties of copper wire, an abrupt change being observed at a certain stage in the reduction of cross-section by drawing. The allotropic change assumed by the author requires more evidence before it can be accepted as an explanation, but the facts are remarkable, and must be taken into account in future work. The volume includes the usual abstracts of publications referring to the non-ferrous metals. C. H. D.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Doppler Effect in the Molecular Scattering of Radiation.

IN connection with the recent work of Prof. Strutt and of Lord Rayleigh on the molecular scattering of light, Sir Joseph Larmor has put forward the interesting suggestion (*Phil. Mag.*, January, 1919, p. 162) that the additive property of the energy elements scattered by the individual molecules is secured by the irregular alterations in the wave-length of the scattered radiation produced (in accordance with Doppler's principle) by the thermal movements of the molecules. There is one interesting feature of the Doppler effect in the scattered radiation to which Sir Joseph Larmor does not specifically direct attention in his paper, and which it seems important to emphasise, namely, that the magnitude of the Doppler effect would depend on the *angle* between the primary and the scattered radiation, and would, in fact, practically vanish in directions nearly the same as that of the primary waves. This follows from the fact that the movement of an individual molecule would alter the effective frequency of the radiation *received* by it, and this has to be taken into account in calculating the effective frequency of the *emitted* radiation as received by the observer. In directions nearly the same as that of the primary radiation there would be practically a complete compensation, and the Doppler effect would vanish.

The importance of the considerations set out above becomes evident when we attempt to explain refractivity on the basis of molecular scattering. This appears possible only if the energy effects due to the individual molecules are *not* additive in directions nearly the same as that of the primary wave, and the vanishing of the Doppler effect in the scattered radiation would seem to be a necessary condition for mutual interference of the radiations from individual molecules to be possible. C. V. RAMAN.

210 Bowbazar Street, Calcutta, March 19.

THE point developed in a new direction by Prof. Raman had been noted by Lord Rayleigh, and was mentioned very cursorily in the last sentence of my paper in the *Phil. Mag.* to which his letter refers. The main purpose of that paper was to express the view that, so far as I understand, independent scattering of light by the molecules of a homogeneous