for variability in rate of vulcanisation. In addition, the authors point out that this variability in respect to rate of cure exists in technical mixings with which manufacturers load the rubber. These mixings are largely mineral constitutents in addition to sulphur. It is further contended that the use of strong accelerating agents, such as oxide of lead, tend to obscure the differences produced in raw rubber by the presence of a natural accelerator.

Recommendations are made to planters which, if adopted, should considerably reduce variability. They are :—

(1) Dilution of latex to a constant rubber content.

(2) The use of acetic acid or other weak organic acid (such as formic acid) as a coagulant.

(3) All coagulating-tanks should be standardised so that the final rubber sheets or crêpe are of the same thickness after rolling.

(4) Conditions of drying and smoking, especially during the early stages, should be kept as uniform as possible.

It is pointed out that if sheets of rubber are of varying thicknesses the rates of drying will be different, and, consequently, there will be more variation in the biological changes which take place during the early stages of drying rubber. H. W.

THE SENSITIVENESS OF PHOTOGRAPHIC PLATES TO X-RAYS.[1]

ALTHOUGH observations have been published on the effect of X-rays on photographic plates, the constants of various plates in use do not appear to have been determined. These experiments follow the standard methods of sensitometry of photographic plates to light in respect of exposure of the plate in strips, of development at a standard temperature and for a constant period (namely, hydroquinone at 20° C. for four minutes), and of the subtraction of the density of a fog strip. The density, *i.e.* the logarithm to the base *e* of the ratio of the intensity of the incident to that of the transmitted light, was determined by a polarisation photometer.

The "exposure" E is defined by the relation $E=V^2it/d^2$, where V, volts, is the pressure applied to the Coolidge tube; *it*, coulombs, the quantity of electricity passing through the tube during the exposure of *t* seconds; and *d*, cms., the distance of the focal spot from the photographic plate. This expression gives the energy of the incident rays. Three values for V were used—31,500, 73,000, and 83,000. The current varied between 0·03 and 0·06 milliampere, which is lower than the currents ordinarily used in radiography. Experiments are in progress using higher intensities of radiation.

When the density, D, for a given plate is plotted against the logarithm of the exposure as above defined, a curve similar to those of Hurter and Driffield is obtained. For densities from 0 to about 1 the curve is convex to the log E axis; above that it is straight to densities of 4, the maximum measured. The intercept on the log E axis of the straight line produced backwards is the logarithm of the inertia of the plate, which was found to be independent of the development. This result is the same as for exposure to the visible light. The slope of the straight portion of the curve gives the contrast. A high value for the contrast is one of the desirable properties of an X-ray plate. The "speed" of a plate may be tentatively defined as the reciprocal of the exposure required to produce a density of 5.

The density produced in a given plate was found to be constant for a constant value of the exposure V^2it/d^2 over the range V 31,500 to 83,000, and for a limited variation of *i* and *t*, but not for a large variation of *i* and *t*. This means that, for the wavelengths used, the density of a plate depends, not on the wave-length, but only on the energy of the X-rays.

Plate	Inertia	Contrast	Speed
Paragon ...	$0{\cdot}74 \times 10^3$	2·4	0·00017
,, ...	1·18	2·3	0·000096
Diagnostic ...	0·71	2·2	0·00015
Sunic	1·00	2·35	0·00012
Seed	1·12	1·9	0·000066
Wratten	1·95	2·2	0·000052
Wellington ...	1·70	2·0	0·000050
Imp. X-ray ...	1·26	1·6	0·000036
Cramer	2·14	1·9	0·000035
Ilford	2·19	1·9	0·000033
Imp. S.R. ..	1·45	1·55	0·000028

[1] Abstract of a paper by Miss N. C. B. Allen and Prof. T. H. Laby read before the Royal Society of Victoria on August 8, 1918.

RAINFALL VARIATIONS.

AT the meeting of the Royal Meteorological Society held on April 16, two papers on variations of rainfall were read. The papers are summarised below.

Mr. A. A. Barnes, in his paper on rainfall in England, the true long-average as deduced from symmetry, stated that it has been usual to assume that the average annual rainfall during any period of thirty-five years can be adopted for obtaining the "long-average" at any rain-gauge, but he considers that the fluctuations which occur between such averages for various thirty-five-year periods tend to show that the basis is somewhat uncertain. By an exhaustive analysis of the annual readings at thirty-eight rain-gauges in England during the sixty-two years 1856–1917, he shows that variations of as much as 5 per cent. on each side of the mean are quite possible when dealing with successive thirty-five-year periods. From these same records it is then shown that far greater consistency in the value of the average can be obtained by taking periods symmetrical about the end of the year 1886. Both by means of tables and diagrams Mr. Barnes shows that that date is a very critical one in regard to rainfall in England, and that, as a rule, the years before that date were relatively far wetter than years subsequent to it. Hence the balancing of the earlier wet years by the later dry years establishes the principle of symmetry about that date, and it is shown that by this method the maximum departure from normal which results from taking each of the fifteen long periods symmetrical to the end of the year 1886 does not exceed 1 per cent. in the case of any of the thirty-eight gauges which were examined.

Mr. C. E. P. Brooks's paper was on the secular variation of rainfall. In order to obtain a measure of the secular variation of rainfall during the past thirty to fifty years, correlation coefficients were worked out between the annual rainfall at each station and "time," the measure of the latter being the number of years before or after the middle year of the series. This was done for 162 stations distributed over the globe, and the results were charted on a map. This map shows that the greater part of the world is divided among a few definite regions of wide extent, in each of which the rainfall has been either increasing or decreasing. The most important area of increasing rainfall is temperate Eurasia (except the western sea-board); other areas are south-east South America and the south of Australia. Areas of decrease are the tropical regions as a whole, South Africa, and the west coast of Europe. It is noted that the number