

stretched duprene, unlike that of polymerisation products of isoprene, resembles that of natural rubber, giving a fully developed fibre diagram showing a number of definite layer lines, the identity period along the fibre axis being 4.8 Å., identical with that of β -gutta-percha.

Saccharification of Wood.—In a communication to the Society of Chemical Industry on Nov. 1, Drs. H. A. Auden and W. P. Joshua described a process for the transformation of wood cellulose into fermentable products on an industrial scale. With an improved method they have succeeded in obtaining thirty-five to forty gallons of alcohol per ton of dry sawdust. This makes the process commercially profitable where the cost per ton of dry sawdust is not more than five shillings and a supply of 200 tons per twenty-four hours is available. The method was worked out in the Research Laboratory of the Distillers' Company, Epsom. It consists in forcing acidulated water (containing two parts per thousand of sulphuric acid), at a temperature of 180° C. and twelve atmospheres pressure, through sawdust packed in lead-lined vessels. Under these conditions 45-50 per cent of the sawdust is changed into fermentable sugars. The molasses thus obtained are fermented with yeast in order to obtain alcohol. A preliminary treatment of the sawdust with superheated steam has

been found advantageous, because it removes resins and other undesirable constituents and also helps the hydrolysis.

Extensibility of Protoplasm.—A communication on the effects of salts on the extensibility of protoplasm, by Prof. William Seifriz and Janet Plowe, appears in the *Journal of Rheology*, vol. 11, No. 3 (Easton, Penn.). The elastic properties of protoplasm are important because of their close relation to other properties of living matter, for example, imbibition, contractility, and structure, and to biological processes like cell-division and amœboid movement. By means of the microdissection method Prof. Seifriz has determined the maximum distance to which protoplasm can be stretched. Strips of the upper epidermis of the bulb scales of *Allium cepa* were first placed in aqueous solutions of the nitrates of potassium, sodium, calcium, etc. Afterwards the cells were plasmolysed in sugar solution so that the cell-wall could be cut without injuring the protoplasm, and the protoplasm was drawn out by means of the micro-needle. It was found that treatment with calcium, strontium, and magnesium increases the elastic limit of the protoplasm, while potassium, sodium, and lithium decrease it. Their relative action may be expressed by the series $Ca > Sr > Mg > K > Li > Na$.

Astronomical Topics.

Eclipse Observations and the Einstein Shift.—Prof. E. Freundlich gave an account of his observations of the Einstein bending of light by the sun's gravitation at the meeting of the Royal Astronomical Society on Dec. 11. Notes on a similar lecture delivered at Oxford on Dec. 2 appeared in NATURE of Dec. 12, p. 993. Prof. Freundlich was probably the very first to attempt observations on the problem; he went to Russia in August 1914 with that end in view, but the outbreak of war caused obstacles to be put in his way, and nothing could be done. Abortive attempts were made at subsequent eclipses; at last he attained full success in Sumatra in the eclipse of 1929. Many precautions, suggested by the experience of others, were taken; in particular, a field of stars at a distance from the sun was photographed during totality, as well as the eclipse field; the two fields were again photographed simultaneously at a later date.

The measures and reductions were made in several different ways, but all agreed in giving a shift at the sun's limb of about 2.25", which is half a second greater than the Einstein theoretical value. Freundlich also rediscussed the measures made at previous eclipses, and expressed the opinion that they are better satisfied by his value than by the Einstein one, and that the excess is a real phenomenon, though its cause is unknown.

Most of the speakers in the discussion showed unwillingness to depart from the Einstein value; Sir Arthur Eddington, however, admitted that the views of the nature of light that are now held make it more complicated than was formerly supposed, so that it is possible that the Einstein equations may not give a complete account of its behaviour.

The Origin of Comets of Short Period.—About half a century ago, R. A. Proctor pointed out that the theory of the capture of these comets by the giant planets involved many serious difficulties. There would not be enough close approaches of comets to Jupiter to provide it with such a large family of comets. This is still more the case than Proctor realised, since convincing proofs have been deduced that the life of these comets is short (of the order of a few centuries), so that the supply must be frequently replenished.

Very few astronomers have supported Proctor's view that these comets were erupted by the giant planets, but *Astr. Nach.* 5826 contains a long paper by S. Vessviatsky which reaches a similar conclusion, and extends the suggestion to include those of the minor planets that have orbits close to that of Jupiter. Many American astronomers favour the suggestion that minor planets are associated with comets in their origin. One of Proctor's arguments was based on the Leonid meteors. Le Verrier had suggested that Tempel's Comet, which formerly contained the meteors, made a near approach to Uranus in A.D. 126, and had its orbit changed from a parabola to an ellipse. Proctor pointed out that an extremely close approach to Uranus would be necessary, and that the cometary mass would need to be condensed to an extent far beyond what we observe in comets; otherwise different portions of it would experience different perturbations, whereas observation shows that the orbits of all the meteors are nearly identical.

Catalogue of Double Stars.—A further instalment of the large catalogue of double stars that is being formed at the Union Observatory, Johannesburg, is published in *Circular* 85 of the observatory. It contains 2017 measures of 488 pairs made in the years 1928-30. The limits of Right Ascension are 13^h to 24^h. As a rule, measures of each star were made on four nights, the separate results and means being given. There are interesting notes on sixty-five pairs; five of them are proved to be merely optical pairs, but the great majority are true binaries. Other notes give comparisons with previous measures, or with ephemerides, where these have been calculated. The pair Innes 600, in south decl. 60°, may have the short period 14 years, or 28 years if the quadrant of the 1913 measure should need reversal. The pair Hussey 298 has described nearly a revolution in thirty years, but apparently its orbit has not been computed yet. A note on a Centauri states that photography gives better results than visual measures; the recent measures give as the correction to Finsen's ephemeris, published in 1926, angle +0.30°, distance -0.08". The great majority of the measures in the catalogue were made with the 26-inch refractor, but a few were made with the 9-inch.