Cocoa-nut Pearls.

REFERRING to the letter of Dr. Sydney J. Hickson, published in your paper of June 16 last (p. 157), I have the pleasure to communicate to you that I have a collection of fourteen cocoa-nut pearls (one of them I myself found in 1866 at Holontalo, North Celebes, in the endosperm of the seed of the cocoa-nut); two melati pearls (*Jasminium sambac*); one tjampaka pearl (*Michelia longifolia*), found in the flowers, according to the natives. One of the cocoa-nut pearls has a pear-shaped form, the length being 28 mm. The common name amongst the natives for this kind of pearls is mustika.

Utrecht, September 6. J. G. F. RIEDEL.

STARS WITH REMARKABLE SPECTRA.

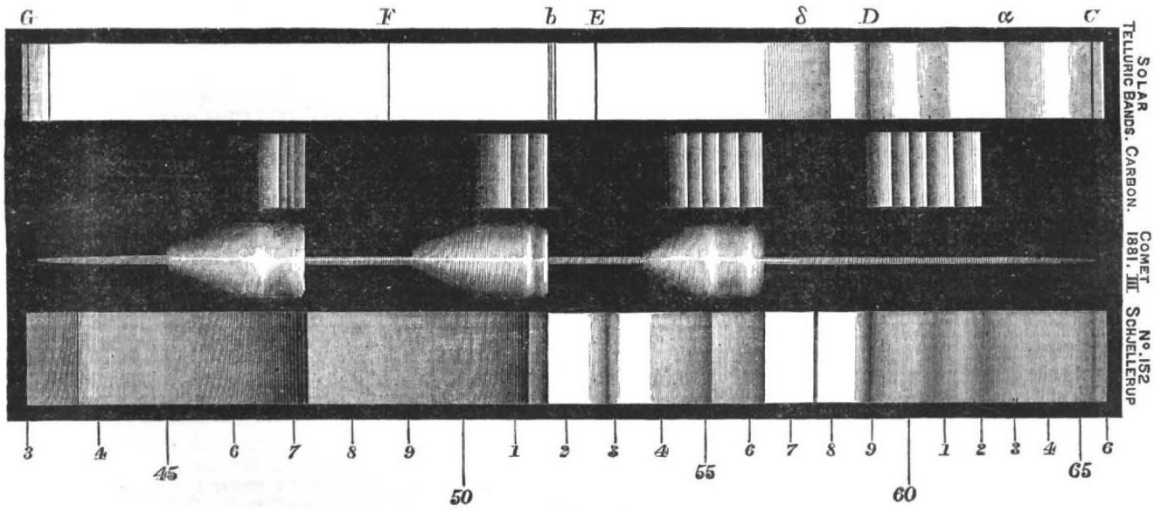
I.

No. 152 *Schjellerup* (*D.M.* + 46° *No.* 1817).

Place 1887·0, *R.A.* 12*h.* 39*m.* 47*s.*, *Decl.* 46° 3′·5 *N.*

THIS star, No. 290 in Mr. Birmingham's Catalogue of Red Stars, may very fittingly be taken as a sample of the stars possessing spectra of the fourth type, to use Secchi's nomenclature, or of the second division of the third type, to follow Vogel's—spectra, that is, in which the prominent feature is a series of dark bands alternating with bright spaces, and in which the dark bands are, as a rule, sharp and dark on the less refrangible side, or that nearer the red, but which gradually fade away into nothingness on the more refrangible side, or that towards the violet. The present star, though not perhaps the one in which the series of bands is most completely developed, has yet a spectrum which is a very beautiful example of the type; the bright interspaces, or zones as they are technically called, are vivid and striking, and the bands broad and dark, and it possesses the additional advantage that, though only of magnitude 5·5, it is yet the brightest star of its class in the northern heavens.

The purpose of the accompanying diagram, in which the spectrum of 152 Schjellerup is seen side by side with that of Tebbutt's comet of 1881, and with a particular carbon spectrum, is to bring into prominence the meaning of the remarkable series of shaded bands which characterize it. In 1869, Secchi had declared that these bands coincided as to position with the bands of the carbon spectrum; but, as Dr. Huggins shortly after stated that he had compared the spectrum of carbon with that of a



SCALE OF WAVE-LENGTHS.

red star, and found that the two did not coincide, it was generally assumed that the Italian observer was mistaken, the well-known skill and accuracy of the great English spectroscopist rendering it very unlikely that his observation should be in error. As the event proved, both were right; it was only the natural inference that the two observations were contradictory that was at fault. Our knowledge of the beautiful and complicated spectra of carbon had not then attained its present precision, and it escaped remark that the spectrum with which Secchi had compared the red stars was not the same that Huggins had used for that purpose. Even now spectroscopists are not wholly unanimous as to whether we should regard these two spectra as both belonging to elemental carbon at different temperatures, or as belonging to two different classes of carbon compounds—those with oxygen and those with hydrogen. The spectrum which Secchi had used was that which, according to Thalén and others, characterizes the hydrocarbons; whilst Huggins used that of the oxides.

The former spectrum is one which was already of high importance to the astronomer. Huggins had shown, in 1868, by comparing Winnecke's comet with olefiant gas, that the three bright bands so typical of a comet coincided precisely with this form of the carbon spectrum; and now Dunér and Vogel have placed it beyond a doubt that in the spectrum of the red stars we see the same spectrum, only reversed—an absorption instead of an emission spectrum. The agreement as to the place of the sharp, well-marked, less refrangible edge of the three principal bands—the yellow, the green, and the blue—is exact within the limit of errors of observation; the shading-off towards the violet is similar in character, and there are indications of the presence of some at least of the secondary flutings which in the carbon spectrum follow the great leaders of the bands in so charmingly rhythmical a manner. The orange band also, placed in a fainter part of the spectrum, and so more difficult to observe, is present, there can be little doubt, in the absorption spectrum of the red stars, though its bright analogue has seldom been satisfactorily traced in the spectrum of a comet; the violet band, on the other hand, appears to have been better seen in the comet than in the red star.

The following table will show the character of the correspondence of the principal bands of the three spectra—