Troisième Mémoire sur les Etoiles Doubles.  Par M. Villarceau.

According to this method the five coefficients of the apparent orbit are deduced from the apparent co-ordinates. The mean motion and the longitude of the epoch are then obtained by means of the time and the law of the areas.

Théorie Analytique de l'Inégalité de Lumière des Etoiles Doubles.  Par M. Villarceau.

In his memoir upon double stars (Connaissance des Temps, 1830), Savary first drew attention to the inequality depending on the difference of the times which light occupies in passing from the two components of a double star to the earth, and he suggested the possibility of hence deducing an inferior limit of the parallax of the star. M. Villarceau having undertaken an analytical investigation of the subject, obtained four inequalities depending upon this principle. The first of these depends simply on the distance of the star from the sun; the second, on the circumstance of the star's approach to, or recess from, the sun; the third, on the proper motion of the star; and the fourth, on the relative masses of the two components. The three inequalities first mentioned are confounded with the elliptic motion of the star. The fourth, which depends on the relation between the masses of the stars, had not been hitherto recognised by any one. If this relation was known, the parallax which is involved with it in the equations of condition might hence be deduced. Since, however, this element is totally unknown, it is impossible to establish even an inferior limit of the parallax by means of such researches.

Note de M. Faye, sur une nouvelle Détermination de la Parallaxe de l'Etoile d'Argelander (1830, Groombridge). Par M. Wichmann.

(Comptes Rendus, Dec. 13, 1852.)

It is well known that M. Faye, by comparing the right ascension of this star with that of another small star situate nearly on the same parallel (whose parallax was supposed to be insensible), found its parallax to amount to 1''08. Subsequently, however, M. Peters, by observations of declination, obtained a parallax of only 0''28. M. Otto Struve, by comparing the observed declinations of the star at different seasons of the year with the corresponding declinations of two other small stars in its vicinity, found the parallax to be 0''03; and M. Wichmann, from observations made at Königsberg with the great heliometer, deduced a parallax amounting only to 0''18.

The observations with the Königsberg heliometer were made by comparing the star of Argelander (A) with two other small stars, a, a', whose parallaxes were supposed to be insensible, and the
parallax of the star A was determined by a discussion of the differences of its distances from the two stars of comparison. The sum of the distances, however, which ought to have been constant, exhibited an annual variation which could not be accounted for by any recognised principle. The hypothesis of this variation being attributable to the influence of temperature upon the different parts of the instrument leads to improbable conclusions. If, however, one of the stars of comparison be supposed to have a sensible parallax, the periodic variation disappears, and the observations are represented with considerable accuracy. M. Wichmann has recently executed a new series of observations with the heliometer, and by a discussion of them founded upon this hypothesis he has found the parallax of A to be 0''68, and the parallax of a to be 1''15. The former observations, treated in a similar manner, assign 0''75 and 1''19 as the parallaxes of the two stars. M. Wichmann's memoir will be found in Nos. 841–844 of the Astronomische Nachrichten.

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Note on the Mean Density of the Superficial Crust of the Earth.  
By M. Plana. (Ast. Nach. No. 828.)

The researches of geometers have established, beyond doubt, that the density of the earth increases towards the centre. Assuming the densities of the successive strata to increase in arithmetical progression, Laplace has investigated the constant amount of increase for each successive stratum, and has hence deduced the mean density of the terrestrial spheroid (Méc. Cél. tome v. liv. xi.). In his researches on this subject, he supposes the density of the superficial stratum (\(\zeta\)) to be three times the density of the sea considered equal to unity. He remarks, that this assumption agrees very nearly with the density of granite. His expression for the density of any stratum is,

\[
\zeta = (\zeta) (1 + e - e \cdot a),
\]

in which \(a\) denotes the radius of the stratum (the mean radius of the superficial stratum being supposed equal to unity), and \(e\) the constant quantity by which the depth of each successive stratum, \(1 - a\) is to be multiplied conformably to the assumed law of density. Admitting the ellipticity of the earth to be equal to 000326, Laplace found the value of \(e\) to be 2349, and hence determined the mean density to be 4764. This value differs considerably from the results which Reich and Baily have deduced from their experiments with the balance of torsion, the former having obtained 5444, and the latter 56604, for the mean density of the terrestrial spheroid, the density of pure water being supposed equal to unity.

The remarks of Humboldt on the density of the superficial stratum of the earth, contained in the first volume of his Kosmos, would seem to imply that the value of this element assumed by Laplace is erroneous. He states, that from the nature of the rocks which constitute the superficial strata of the solid parts of the globe, the