OUR ASTRONOMICAL COLUMN

CHANGE OF COLOUR IN A STAR.—Dr. Klein of Cologne first directed attention to a periodical change of colour in the star α Ursæ Majoris, from yellow to an intense fiery red, and estimated the duration of the period to be about five weeks. In a communication to the *Astronomische Nachrichten*, he gives observations by Herr Weber from August 22, 1876, to October 24, which support his inference. Thus on September 5 and October 10 the star was considered "stark feuerroth" and "feuerroth, tief," while on August 22 and October 24, it was noted "weissgelb" and "gelb, schwach blaulich" respectively: from September 5 to October 10 is a period of thirty-five days, confirming the earlier estimation by Dr. Klein. Herr Weber observed with a Steinheil achromatic of $2\frac{3}{8}$ inches aperture, and $3\frac{1}{2}$ feet focal length with a power of 90. Probably since the suspicion of a regular change of colour was made known, the star has engaged the attention of other amateurs, who may be able to add something to the evidence pro or con.

NEW DOUBLE STARS.—Mr. Ormond Stone, Director of the Observatory, Cincinnati, has circulated a list of fifty double stars, varying in distance from 0"·8 to 8"·0, which are assumed to be new, and which have been recently found by Mr. Howe with the eleven-inch refractor; the whole are included between 8° and 40° south declination. Positions are given for 1880, with estimated angles and distances, and the magnitudes of the components. Since the number of rapidly-revolving double-stars is probably much greater than at present known, it appears very desirable that micrometrical measures of objects newly discovered should be at once placed upon record, in place of merely estimated angles, which form no satisfactory starting-points for the calculation of orbits.

THE BINARY STAR η CASSIOPEÆ.—Dr. Gruber, of Buda-Pesth, has investigated elements of this binary, from normal position-angles formed with the aid of Duner's orbit. His figures agree as nearly as can be expected in such a case with those obtained by the careful calculation of Doberck. With the value of annual parallax obtained by O. Struve, viz., 0"·154, we find—

	Gruber.	Doberck.
Mass of the system	4·632	... 5·256
Semi-axis major	56·097	... 63·831

The sun's mass is taken for unity, and the semi-axis major is expressed in mean distances of the earth from the sun. Dr. Gruber's period is $195\frac{1}{4}$ years.

In the only two cases which we are at present able to compare with that of η Cassiopeæ we have for α Centauri, mass of system = 2·2 sun-masses, while for 70 Ophiuchi the similar value is 3·1.

THE MASS OF NEPTUNE.—It is understood that M. Leverrier, from his final researches on the motion of Uranus, obtains a sensibly larger value for the mass of Neptune than has been assigned by Prof. Newcomb, and one approximating to that which was inferred many years since from Mr. Lassell's direct measures of the distances of the satellite.

THE NAUTICAL ALMANAC FOR 1880 has been published during the last week. The ephemeris of the planet Saturn, which since the appearance of the almanac in its improved form has hitherto been founded upon Bouvard's Tables, is computed from heliocentric plans communicated by M. Leverrier in advance of the publication of his new tables in vol. xii. of the *Annales* of the Observatory of Paris; the number of standard stars has been increased from 149 to 197, and in extending Damoiseau's Tables of Jupiter's satellites, certain corrections supplied by Prof. Adams have been introduced.

The impression of the *Nautical Almanac* now considerably exceeds 20,000 copies.

METEOROLOGICAL NOTES

ACCELERATED TRANSMISSION OF WEATHER MAPS.—The *New York Herald* of November 7 publishes a map of the weather of that morning, exhibiting the lines of atmospheric pressures and of the temperatures over the United States. The meteorological charting which was finished at the Central Office in Washington at 10 A.M. was immediately transmitted from Washington in *fac-simile* by telegraph to Philadelphia, where it was received at 10.30 A.M. It was shortly thereafter published in the supplement of the *New York Herald* of the same day, being the first occasion on which such telegraphic charting had appeared in any newspaper. The fact of telegraphing and printing such charts solves one of the greatest difficulties of exchanges of Weather Reports. It may now be regarded as only a question of time when the more important newspapers of our British large towns will be in a position to present their readers every morning with a chart of the weather as existing only two or three hours before going to press; and indeed it will not be till this result be effected that the practical utility of weather warnings will be properly developed, owing to our close proximity to the Atlantic and the rate at which our weather-changes pass to the eastward.

GREAT STORM OF WIND AT SYDNEY.—Mr. Russell, the Government astronomer at Sydney, reports that during a heavy storm of wind which occurred in that part of Australia on Sunday, September 10, the wind, in a gust lasting one or two minutes, attained the extraordinary rate of velocity of 153 miles per hour, as ascertained by Robinson's cup anemometer; and that during the twelve minutes, from 12.18 to 12.30 A.M. $22\frac{1}{2}$ miles of wind passed the Observatory, being at the rate of 112 miles per hour. This extraordinary recorded velocity may be regarded as a new contribution to meteorological observation, and we look with much interest to the description which will doubtless be given of the method by which it was determined. It scarcely admits of a doubt that the maximum velocity or force of the wind that occurs in great storms is frequently much understated.

THE TEMPERATURE OF THE NORTHERN PART OF THE ATLANTIC.—An important contribution to the physics of the North Atlantic appears in the November number of *Petermann's Geogr. Mittheilungen*, in a paper by Prof. Mohn on the temperature of the sea beween Norway, Scotland, Iceland, and Spitzbergen The material employed in the discussion consists of the observations collected by the Norwegian Meteorological Institute from the lighthouses on the coast of Norway and from Norwegian ships, and the observations published by the Scottish Meteorological Society from their stations in Scotland, Farö, and Iceland—the observing stations, exclusive of the ships, numbering twenty-two. At places where observations only for two or three years are available, they are reduced to the longer period of the nearest station by the process of differentiation, with the result that virtually the averages are all good and fairly comparable with each other. The results are represented on seven charts, well executed in colours, showing by six distinct shades, as well as by isothermal lines, the distribution of temperature over this portion of the Atlantic for each set of two months and for the year, and the changes in the positions of the same temperatures from season to season. The outstanding feature of the charts is a strong-marked warm thermal axis, taking a north-easterly direction about 150 miles to westward of Scotland and Norway, extending even beyond the North Cape. Along this line of warm water temperatures are considerably higher than elsewhere in the same latitude. On the July-August chart, however, the warm axis approaches much nearer to the coast of Norway, and extends only from off the Naze to about lat. 66°. From June to September the North Sea is coldest on the Scottish coast and warmest in the Skagerak, but during the rest of the year this is reversed.

In other words, during the hottest months the influence of the heated land is powerfully felt, but during the other two-thirds of the year the peculiar distribution of the temperature is determined by the strong south-westerly winds and current of the Atlantic. This influence of the Atlantic on the temperature of Western Europe is enormous, the thermic anomaly for January being estimated by Prof. Mohn to be 10°·8 in the interior of Norway, 25°·2 in Scotland, 32°·4 in the north-west of Iceland, while in Lofoten it amounts to 41°·4. In May–June and in a slight degree in July–August, a large extent of cold water appears as if thrust out from the Arctic Sea west of Jan Mayen to the south-eastwards as far as Farö, deflecting and crowding together the whole of the isothermals over this region in a most remarkable manner. This is a point which well deserves the most careful investigation, not merely from its evident importance to the fisheries of this part of the Atlantic, but also from its meteorological significance, it being in May and June that atmospheric pressure reaches its annual maximum, northerly and easterly winds their greatest predominance, the weather becomes brightest and clearest, and the rainfall sinks to its annual minimum over the extreme north-west of Europe. An instructive comparison is also made between the temperature of the sea and that of the air, and a valuable discussion is added of the observations made at different depths of the sea between Iceland and Norway; but for these and other interesting points we must refer to the paper itself.

BIOLOGICAL NOTES

New Fresh-water Rhizopods.—For many years the small group known as Actinophrys, first accurately described by Ehrenberg, remained somewhat isolated, distinguished among unicellular forms by its nearly constant spherical form, and the persistence of its straight radiating processes or "pseudopodia." But in recent years a whole series of organisms has been described, and has attained sufficient prominence to constitute, with Actinophrys, an order denominated Heliozoa. Many interesting papers have appeared in the *Archiv für mikroskopische Anatomie* on these organisms, contributed by E. Hertwig, Lesser, Cienkowski, Greeff, and others; and in our own country Mr. W. Archer has been the most active and successful student of the Heliozoa, his papers having been principally published in the *Quarterly Journal of Microscopical Science*. From these one derives an idea of these animalcules as being the most complex of the free forms which possess pseudopodia, and are at the same time unicellular; they are neither multicellular and differentiated like the Radiolaria, nor organised like the ciliated Infusoria. While a few forms, as Actinophrys, are quite devoid of skeleton, most of them possess certain hard parts, consisting, it may be, of a single solid and globular piece, but in other cases of very minute rod-shaped spicules, sometimes siliceous, sometimes easily soluble. These are either disposed so as to invest the main body of the organism more or less closely, or radially, projecting as spines. When food is taken, these minute hard parts can be pushed aside to allow access to the central body-mass; and the same occurs when indigestible material is thrust out. Locomotion is usually very slow; most Heliozoans move by balancing themselves on the tips of their pseudopodia, and thus very gradually rolling onwards. Multiplication of the organisms is effected by division, either simple, or occurring after encystation. Some forms are remarkable for containing a great abundance of chlorophyll granules.

Re-arrangement of the Orders of Endogens.—At a recent meeting of the Linnean Society of London, Mr. Bentham proposed an entirely new arrangement of the orders of Endogens, which he believes to be more in accordance with their genetic affinities and the essential points of their structure, than any at present in use. He proposes to classify Endogens under four series, viz., 1. Epigynæ; flowers with a double usually petaloid perianth; ovary usually inferior syncarpous. 2. Coronarieæ; flowers with a double usually petaloid perianth; ovary superior, almost always syncarpous. 3. Nudifloræ; flowers usually achlamydeous, or with a dry perianth; ovary mostly apocarpous; and 4. Glumales; perianth replaced by membranous scales (pales or lodicules); ovary always uniovular. The orders are arranged thus in the four series:—in the first, Hydrocharideæ, Scitamineæ (including Musaceæ, Cannaceæ, &c.), Orchideæ, Burmanniaceæ, Irideæ, Amaryllideæ (including Hæmodoraceæ), Taccaceæ, Dioscorideæ, and Bromeliaceæ (?); to the second, Roxburghiaceæ, Liliaceæ (including Melanthaceæ, Smilaceæ, &c.), Pontederiaceæ, Philydraceæ, Xyrideæ, Commelynaceæ, Junceæ, and Palmæ; to the third, Pandaneæ, Aroideæ, Typhaceæ, Lemnaceæ, Naiades (including Juncagineæ), and Alismaceæ (?); and to the fourth, Eriocauleæ, Centrolepideæ, Restiaceæ, Cyperaceæ, and Gramineæ.

The Sensation of Sound.—At a recent meeting of the Vienna Academy a paper was communicated by Dr. Isidor Hein "On the Relations between Perceptions of Touch and of Hearing." His conclusions are these:—1. The sound produced by striking a solid body is always accompanied by a sensation of touch, which, like the sound, differs according to the nature of the body. If the sound is different in different parts of a body, there goes along with the variation of the sound, a variation in the touch-sensation; and if the surface be divided into several sections according to differences in sound, a congruent division may be made on the basis of touch. 2. On bringing a struck body towards a reflecting wall, the sound and touch-perceptions show similar variations. 3. To the touch-perception in question correspond vibratory motions of the exterior body, produced even with the weakest striking, whereas sound only begins to be perceived with impacts of a certain intensity. 4. The sense of touch is capable of perceiving vibrations and comparing the differences of these. It brings hereby to consciousness, a special quality of touch-sensation, which is to be distinguished from sensation of pressure. 5. This distinguishing power of the organ of touch, not sufficiently appreciated hitherto, offers practical medicine a peculiar mode of investigation, which greatly enlarges the doctrine of the physical symptoms of the human organism, and for which the author suggests the (German) name of "Erschutterungs-palpation."

The Absorption of Organic Matter by Plants.—In a communication from Prof. Calderon, of the Institute of Las Palmas, Canary Isles, he contests the ordinary view that the nitrogen of the tissues of plants is derived entirely from the nitrates and ammoniacal salts absorbed through the roots. He does not, however, adopt the old theory that the source is the free nitrogen of the atmosphere, but rather the nitrogenous organic matter which is always floating in the air. The nutrition of plants he divides into three classes: *necrophagous*, the absorption of dead organic matter in various stages of decomposition; *plasmophagous*, the assimilation of living organic matter without elimination, or distinction of any kind between useful and useless substances, such as the nutrition of parasites; and *biophagous*, the absorption of living organisms, such as that known in the case of insectivorous plants. A further illustration of the latter kind of nutrition is, according to Prof. Calderon, furnished by all plants provided with viscid hairs or a glutinous excretion, the object of which is the detention and destruction of small insects. To prove the importance of the nitrogenous substances floating in the air to the life of plants, he deprived air of all organic matter in the mode described by Prof. Tyndall, and subjected lichens to the access only of this filtered air and of distilled water, when he found all their physiological functions to be suddenly suspended.