

At Greenwich on June 6

Sun rises, 3h. 47m.; souths, 11h. 58m. 23'3s.; sets, 2oh. 9m.; decl. on meridian, 22° 41' N.: Sidereal Time at Sunset, 13h. 10m.

Moon (at First Quarter on June 9) rises, 8h. 10m.; souths, 15h. 49m.; sets, 23h. 17m.; decl. on meridian, 15° 7' N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury	3 25	11 29	19 33	21 45 N.
Venus	2 10	9 7	16 4	10 20 N.
Mars	11 47	18 18	0 49*	5 28 N.
Jupiter	12 31	18 48	1 5*	2 43 N.
Saturn	5 26	13 37	21 48	22 43 N.

* Indicates that the setting is that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

June	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	
10	B.A.C. 4043	6½	0 5	0 51	74 325
11	38 Virginis	6	1 0	near approach	200 —
June	h.				
9	9				Mars in conjunction with and 0° 6' north of the Moon.
9	22				Jupiter in conjunction with and 0° 1' north of the Moon.
11	5				Mercury at least distance from the Sun.
12	2				Mercury in superior conjunction with the Sun.

Variable Stars

Star	R.A.	Decl.	h. m.
	h. m.	°	h. m.
U Cephei	0 52.2	81 16 N.	June 9, 2 16 m
S Canis Minoris	7 26.5	8 34 N.	„ 11, m
W Virginis	13 20.2	2 47 S.	„ 8, 21 40 M
δ Libræ	14 54.9	8 4 S.	„ 6, 0 50 m
U Coronæ	15 13.6	32 4 N.	„ 7, 1 16 m
U Ophiuchi	17 10.8	1 20 N.	„ 11, 0 42 m
X Sagittarii	17 40.4	27 47 S.	„ 12, 2 20 M
W Sagittarii	17 57.8	29 35 S.	„ 6, 2 25 M
T Herculis	18 4.8	31 0 N.	„ 11, m
η Aquilæ	19 46.7	0 43 N.	„ 11, 21 30 M
R Sagittæ	20 8.9	16 23 N.	„ 10, m
δ Cephei	22 24.9	57 50 N.	„ 6, 0 0 m
			„ 12, 21 35 M

M signifies maximum; m minimum.

Meteor Showers

Radiants near β Ophiuchi, R.A. 261°, Decl. 5° N., from Sagitta, R.A. 292°, Decl. 15° N., and from Vulpecula, R.A. 312°, Decl. 24° N., are represented at this time of the year, as well as the *Cygnids II.*, R.A. 319°, Decl. 32° N.

GEOGRAPHICAL NOTES

THE French forces in Tonquin having now succeeded in occupying Lao-Kai, near the Chinese frontier, the capital of the Black Flag State, the whole course of the Red River in Tonquin is for the first time open to exploration. Accordingly two flat-bottomed gunboats with an exceedingly small draught have been built and equipped, and left Hanoi on April 3 to ascend the river, having on board officers whose duty it is to survey the river and the adjacent country, to fix the positions of the most important points, and to produce a map of the whole.

AT the meeting of the Geographical Society of Paris on the 21st ult., M. de Lesseps referred to the works on the Panama Canal, and argued that locks or dams were unnecessary. M. Aubry gave a summary of a journey which he made in 1883 and 1884 to Choa and the Gallas country in pursuit of a mission with which he was charged by the Minister of Public Instruction. He collected a large number of mineralogical specimens, and studied the region from a geological and palæontological point of view. He also surveyed the courses of two rivers.

THE Government of British North Borneo has secured the services of Capt. Beeston for the purpose of making a mineralogical and geographical survey of the country. He has started for the Segama River, which has already been visited by Frank

Hatton, to investigate the localities in which gold is said to have been found.

AT the instance of the Société de Géographie Commerciale of Nantes, a Commercial-Geographic Exhibition will be held in that city between June 15 and August 15 next. According to the programme the Exhibition will be divided into five classes: (1) scientific geography; (2) ethnography; (3) travelling and means of communication; (4) French and French-Colonial produce; (5) educational material.

ON RECENT PROGRESS IN THE COAL-TAR INDUSTRY¹

THOSE who have read Goethe's episodes from his life, known as "Wahrheit und Dichtung," will remember his description of his visit in 1741 to the burning hill near Dutweiler, a village in the Palatinate. Here he met old Stauf, a coal philosopher, *philosophus fer ignem*, whose peculiar appearance and more peculiar mode of life, Goethe remarks upon. He was engaged in an unsavoury process of collecting the oils, resin, and tar obtained in the destructive distillation of coal carried on in a rude form of coke oven. Nor were his labours crowned with pecuniary success, for he complained that he wished to turn the oil and resin to account, and save the soot, on which Goethe adds that, in attempting to do too much, the enterprise altogether failed. We can scarcely imagine, however, what Goethe's feelings would have been could he have foreseen the beautiful and useful products which the development of the science of a century and a half has been able to extract from Stauf's evil-smelling oils. With what wonder would he have regarded the synthetic power of modern chemistry, if he could have learnt that not only the brightest, the most varied colours of every tone and shade can be obtained from this coal-tar, but that some of the finest perfumes can, by the skill of the chemist, be extracted from it. Nay, that from these apparently useless oils, medicines which vie in potency with the rare vegeto-alkaloids can be obtained, and lastly, perhaps most remarkable of all, that the same raw material may be made to yield an innocuous principle, termed *saccharine*, possessed of far greater sweetness than sugar itself. The attainment of such results might well be regarded as savouring of the chimerical dreams of the alchemist, rather than expressions of sober truth, and the modern chemist may ask a riddle more paradoxical than that of Samson, "Out of the burning came forth coolness, and out of the strong came forth sweetness"; and by no one could the answer be given who had not ploughed with the heifer of science, "What smells stronger than tar, and what tastes sweeter than saccharine?" That these are matters of fact we may assure ourselves by the most convincing of all proofs—their money value, and we learn that the annual value of the products now extracted from an unsightly and apparently worthless material amounts to several millions sterling, whilst the industries based upon these results give employment to thousands of men.

Sources of the Coal-tar Products.—In order to obtain these products, whether colours, perfumes, antipyretic medicines, or sweet principle, a certain class of raw material is needed, for it is as impossible to get nutriment from a stone as to procure these products from wrong sources. All organic compounds can be traced back to certain hydrocarbons, which may be said to form the skeletons of the compounds, and these hydrocarbons are divisible into two great classes: (1) the paraffinoid, and (2) the benzenoid hydrocarbons. The chemical differences both in properties and constitution between these two series are well marked. One is the foundation of the fats, whilst the other class gives rise to the essences or aromatic bodies. Now all the colours, finer perfumes, and antipyretic medicines referred to, are members of the latter of these two classes. Hence if we wish to construct these complicated structures, we must employ building materials which are capable of being cemented into a coherent edifice, and therefore we must start with hydrocarbons belonging to the benzenoid series, as any attempt to build up the colours directly from paraffin compounds would prove impracticable. Of all the sources of hydrocarbons, by far the largest is the natural petroleum oils. But these consist almost entirely of paraffins, and hence this source is commercially inapplicable for the production of colours. We have, however, in coal itself, a raw material which

¹ A Discourse by Prof. Sir Henry E. Roscoe, M.P., LL.D., F.R.S. delivered at the Royal Institution, Friday, April 16, 1886.