At Greenwich on June 6

Sun rises, 3h. 47m.; souths, 11h. 58m. 23·3s.; sets, 20h. 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. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
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. h. m.	Decl. ° ′		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 INDUSTRY[1]

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 per 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.

by suitable treatment may be made to yield oils of a valuable character. Of these treatments, that followed out in the process of gas-making is the most important, for in addition to illuminating gas in abundant supply, tar is produced which contains principally that benzenoid class of substances already referred to, and which, to use the words of Hofmann, "is one of the most wonderful productions in the whole range of chemistry." The production of these latter as distinguished from the paraffinoid group appears to depend upon a high temperature being employed to effect the necessary decomposition.

The quantity of coal made into coke for use in the blast furnace is larger than that distilled for gas-making, no less than between eleven and twelve million tons of coal being annually consumed in the blast furnaces of this country in the form of coke, and capable of yielding two million tons of volatile products. Up to recent times, however, the whole of these volatile products has been burnt and lost in the coke ovens. But lately, various processes have been devised for preventing this loss, and for obtaining the oils, which might be made available as colour-producing materials. It is, moreover, a somewhat remarkable fact that only in one or two cases have the conditions been complied with which render it possible to obtain the necessary benzenoid substances. In the ordinary coking ovens, as well as in the blast furnaces, although the temperature ultimately reached is far in excess of that needed to form the colour-giving hydrocarbons, yet the heating process is carried on so gradually that the volatile products from the coal are obtained in the form of paraffinoid bodies mainly, and hence are useless for colour-making purposes. Amongst the few coking processes in which the heat is suddenly applied, and consequently a yield of colour-giving hydrocarbons is obtained, may be mentioned the patented process of Simon-Carvès, the use of which is now spreading in England and abroad. The tar obtained in this process is almost identical in composition with the average gas-works tar, whilst the coke also appears to be equal for iron-smelting purposes to that derived from other coke ovens. A third source of these oils yet remains to be mentioned, viz. those obtained as a by-product in blast furnaces fed with coal.

TABLE I.—*One Ton of Lancashire Coal yields when distilled in Gas Retorts on an Average*

Gas (cubic feet).	Ammoniacal Liquor, 5° Tw.	Equal to Ammonium Sulphate.	Coal (Gas) Tar, sp. gr. 1·16.	Coke.
10,000	20 to 25 gallons.	30 lbs.	12 gallons = 139·2 lbs.	13 hundredweights.

Twelve Gallons of Gas-Tar yield (Average of Manchester and Salford Tar)

Benzene.	Toluene.	Phenol proper.	Solvent Naphtha for India-rubber, containing the three Xylenes.	Heavy Naphtha.	Naphthalene.	Creosote.	Heavy Oil.	Anthracene.	Pitch.
lb. 1·10 = Aniline 1·10	lb. 0·90 = Toluidine 0·77	lb. 1·5	lb. 2·44 yielding 0·12 Xylene = 0·07 Xylidine	lb. 2·40	lb. 6·30 = α Naphthylamine 5·25 = α or β Naphthol 4·75 = Vermilline Scarlet, RRR 7·11 or = Naphthol Yellow[1] 9·50	lb. 17·0	lb. 14	lb. 0.46	lb. 69.6
= Magenta 0·623		Aurin 1·2						Alizarin 20 %. 2·25.	
or 1·10 lb. Aniline yields 1·23 lb. Methyl Violet.									

Dyeing Power of Colours from 1 *Ton of Lancashire Coal.*

lb. 0·623 Magenta or	lb. 1·23 Methyl Violet	lb. 9·50 Naphthol Yellow or	lb. 7·11 Vermilline	lb. 1·2 Aurin	lb. 2·25 Alizarin 20 %
dye	dye	dye	dye	dye	dye
500 yards 27 in. wide Flannel a full shade.	1000 yards 27 in. wide Flannel a full Violet.	3800 yards 27 in. wide Flannel a full Yellow.	2560 yards 27 in. wide Flannel a full Scarlet.	120 yards 27 in. wide Flannel a full Orange.	255 yds. Printer's cloth a full Turkey Red.

Dyeing Power of Colours from 1 *lb. of Lancashire Coal.*

Magenta or	Violet	Yellow or	Scarlet	Orange	Turkey Red
a piece of Flannel 8 in. by 27 in.	a piece of Flannel 24 in. by 27 in.	a piece of Flannel 61 in. by 27 in.	a piece of Flannel 41 in. by 27 in.	a piece of Flannel 1·93 in. by 27 in.	a piece of Flannel 4 in. by 27 in.

[1] The Naphthol Yellow is a representative colour from α Naphthol, while the Vermilline Scarlet is a representative colour from the combination of α Naphthylamine with β Naphthol.

Another condition has, in addition, to be considered in this industry, and that is the nature of the coal employed for distillation. It is a well-known fact that if Lancashire cannel be exclusively employed in gas-making a highly-luminous gas is obtained, but the tar is too rich in paraffins to be a source of profit to the tar-distiller, whilst, on the other hand, coal of a more anthracitic character, like that from Newcastle or Staffordshire, yields a tar too rich in one constituent, viz. naphthalene, and too poor in another, viz. benzene. It is also known to those engaged in carbonising coal principally for the sake of the tar that the coal from different measures, even in the same pit, yields tars of very different constitution. That under these varying conditions products of varying composition are obtained is a result that will surprise no one who considers the complicated chemical changes brought about in the process of the destructive distillation of coal.

History of Benzene and its Derivatives.—Having thus sketched the principles upon which the formation of these valuable tar colours depends, we should do wrong to pass over the history of the discovery of benzene (C_6H_6), which contributed so much to the unlocking of the coal-tar treasury.

Faraday in 1825 discovered two new hydrocarbons in the oils obtained from portable gas. One of these was found to be butylene (C_4H_8); to the other Faraday gave the name of bicarburet of hydrogen, as he ascertained its empirical formula to be C_2H ($C = 6$). By exploding its vapour with oxygen, he observed that one volume contains 36 parts by weight of carbon to 3 parts by weight of hydrogen, and its specific gravity compared with hydrogen is therefore 39.[1]

Mitscherlich, in 1834, obtained the same hydrocarbon by distillation of benzoic acid, $C_7H_6O_2$, with slaked lime, and termed it benzin. He assumed that it is formed from benzoic acid simply by removal of carbon dioxide. Liebig denied this, adding the following editorial note to Mitscherlich's memoir:—"We have changed the name of the body obtained by Prof. Mitscherlich by the dry distillation of benzoic acid and lime, and termed by him benzin, into benzol, because the termination 'in' appears to denote an analogy between strychnine, quinine, &c., bodies to which it does not bear the slightest resemblance, whilst the ending in 'ol' corresponds better to its properties and mode of production. It would have been perhaps better if the name which the discover, Faraday, had given to this body had been retained, as its relation to benzoic acid and benzoyl compounds is not any closer than it is to that of the tar or coal from which it is obtained."

Almost at the same time Péligot found that the same hydrocarbon occurs, together with benzone, $C_{13}H_{10}O$ (diphenylketone, $CO(C_6H_5)_2$), in the products of the dry distillation of calcium benzoate.

The different results obtained by Mitscherlich and Péligot are represented by the following formulæ:—

$$C_7H_6O_2 + CaO = C_6H_6 + CaCO_3.$$
$$(C_7H_5O_2)_2Ca = C_{13}H_{10}O + CaCO_3.$$

TABLE II.

	1. *Benzene.*	2. *Toluene.*	3. *Phenols.*	4. *Xylene.*	5. *Naphthalene.*	6. *Anthracene.*
Yellows	Orange Yellow, or Acid Yellow	...	Picric Acid	...	Manchester Yellow (Dinitronaphthol)	Alizarin (pure
	Metanil Yellow	...	...	...	Naphthol Yellow	Anthrapurpurin
	Auramine	...	...	...	...	
Browns	Brown, Y	Bismarck Brown, R	...	...	...	Flavopurpurin
Oranges	Diphenylamine Orange (Blackley Orange)	...	...	...	...	
	Chrysoidine, Y	Chrysoidine, R	Aurin	...	...	
	Orange I. (mixture of 1 and 5)	...	...	...	...	
	Orange II. (1 and 5)	...	...	...	...	
	Orange III. (Helianthine)	...	...	...	...	
	Orange IV.	...	...	...	...	
Reds	Safranin	Magenta, R	Eosin	...	Bordeaux	
	...	Magenta, B	Safrosin	...	Vermilline Scarlet, R	
	...	...	Cyanosine	...	Vermilline Scarlet, R R R	
	...	...	Rose Bengal	...	Vermilline Scarlet, B B B	
	...	...	Phloxin	...	Roccellin	
	...	...	Erythrosin	(Mixture of Xylene and Naphthalene)	(Mixture 1 and 5) New Red	
	...	...	...	Xylidine Scarlet	Biebrich Scarlet	
	...	...	...	(Mixture of Cumene and Naphthalene)	Crocein Scarlet	
	...	...	...	Cumidine Scarlet	... (Mixtures of 1 and 5)	
Blues	Diphenylamine Blue	Blackley Blue, R	...	...	Victoria Blue, 1	
	Methylene Blue	Blackley Blue, 1	...	...	Victoria Blue, 5	
	Indulin (Campbelline)	Alkali Blue, R	...	...	...	
	...	Alkali Blue, 6 B	...	...	...	
Violets	Methyl Violet, 6 B	...	...	...	...	
	Methyl Violet, R	...	...	...	...	
Greens	Malachite Green	...	...	...	...	
	Brilliant Green	...	...	...	...	
	Acid Green (Acid Green)	...	...	...	...	

Péligot obtained benzene only as a by-product, exactly as in the preparation of acetone (dimethylketone) from calcium acetate a certain quantity of marsh gas is always formed.

It is not clear how Liebig became acquainted with the fact that benzene is formed by the dry distillation of coal, as his pupil Hofmann, who obtained it in 1845 from coal-tar, observes: "It is frequently stated in memoirs and text-books that coal-tar oil contains benzene. I am, however, unacquainted with any research in which this question has been investigated." It is, however, worthy of remark that about the year 1834, at the time when Mitscherlich had converted benzene into nitrobenzene, the distillation of coal-tar was carried out on a large scale in the neighbourhood of Manchester; the naphtha which was obtained was employed for the purpose of dissolving the residual pitch, and thus obtaining black varnish. Attempts were made to supplant the naphtha obtained from wood-tar, which at that time was much used in the hat factories at Gorton, near Manchester, for the preparation of "lacquer," by coal-tar naphtha. The substitute, however, did not answer, as the impure naphtha left, on evaporation, so unpleasant a smell, that the workmen refused to employ it. It was also known, about the year 1838, that wood-naphtha contained oxygen, whilst that from coal-tar did not, and hence Mr. John Dale attempted to convert the latter into the former, or into some similar substance. By the action of sulphuric acid and potassium nitrate, he obtained a liquid possessing a smell resembling that of bitter almond oil, the properties of which he did not further investigate. This was, however, done in 1842 by Mr. John Leigh, who exhibited considerable quantities of benzene, nitrobenzene, and dinitrobenzene, to the Chemical Section of the British Association meeting that year in Manchester. His communication is, however, so printed in the Report, that it is not possible from the description to identify the bodies in question.

Large quantities of benzene were prepared in 1848, under Hofmann's direction, by Mansfield, who proved that the naphtha

[1] *Phil. Trans.*, 1825, p. 440.

in coal-tar contains homologues of benzenes, which may be separated from it by fractional distillation. On the 17th of February, 1856, Mansfield was occupied with the distillation of this hydrocarbon, which he foresaw would find further applications, for the Paris Exhibition, in a still. The liquid in the retort boiled over and took fire, burning Mansfield so severely that he died in a few days.

The next step in the production of colours from benzene and toluene is the manufacture of nitrobenzene, $C_6H_5NO_2$, and nitrotoluene, $C_7H_7NO_2$. The former compound, discovered in 1834 by Mitscherlich, was first introduced as a technical product by Collas under the name of artificial oil of bitter almonds, and Mansfield in 1847 patented a process for its manufacture. It is now used for perfuming soap, but mainly for the manufacture of aniline ($C_6H_5NH_2$) for aniline blue and aniline black and for magenta. It is made on a very large scale by allowing a mixture of well-cooled fuming nitric acid and strong sulphuric acid to run into benzene contained in cast-iron vessels provided with stirrers.

To prepare aniline from nitrobenzene, this compound is acted upon with a mixture of iron turnings and hydrochloric acid in a cast-iron vessel. Commercial aniline is a mixture of this compound with toluidine obtained from toluene contained in commercial benzene. Some idea of the magnitude of this industry may be gained from the fact that in one aniline works near Manchester no less than 500 tons of this material are manufactured annually. From the year 1857, after Perkin's celebrated discovery[1] of the aniline colours, up to the present day, the history of the chemistry of the tar products has been that of a continued series of victories, each one more remarkable than the last.

Coal-tar Colours.—To even enumerate the different chemical compounds which have been prepared during the last thirty years from coal-tar would be a serious task, whilst to explain their constitution and to exhibit the endless variety of their coloured derivatives which are now manufactured would occupy far more time than is placed at my disposal. On the industrial importance of these discoveries the speaker reminded his audience of the wonderful potency of chemical research, as shown by the fact that the greasy material which in 1869 was burnt in the furnaces or sold as a cheap waggon grease at the rate of a few shillings a ton, received two years afterwards, when pressed into cakes, a price of no less than one shilling per pound, and this revolution was caused by Gräbe and Liebermann's synthesis of alizarin, the colouring matter of madder,[2] which is now manufactured from anthracene at a rate of more than two millions sterling per annum ; and it is stated that an offer was once made, in the earlier stages of its history, by a manufacturer of anthracene to the Paris authorities to take up the asphalt used in the streets for the purpose of distilling it, in order to recover the crude anthracene.

Again, we have in the azo-scarlets derived from naphthalene a second remarkable instance of the replacement of a natural colouring matter, that of the cochineal insect, by artificial tar-products, and the naphthol-yellows are gradually driving out the dyes obtained from wood extracts and berries. It is, however, true that some of the natural dye-stuffs appear to withstand the action of light better than their artificial substitutes, and our soldiers' red coats are still dyed with cochineal.

The introduction of these artificial scarlets has, it is interesting to note, greatly diminished the cultivation of cochineal in the Canaries, where, in its place, tobacco and sugar are now being largely grown.

Let us next turn to inquire as to the quantities of these various products obtainable by the distillation of one ton of coal in a gas-retort. The six most important materials found in gas-tar from which colours can be prepared are :—

1. Benzene.	4. Metaxylene (from solvent naphtha).
2. Toluene.	5. Naphthalene.
3. Phenol.	6. Anthracene.

The average quantity of each of these six raw materials obtainable by the destructive distillation of one ton of Lancashire coal is seen in Table I. Moreover, this table shows the average amount of certain colours which each of these raw materials yields, viz. :—

1. } 2. } Magenta 0·623 lb.	4. (*Xylidine* 0·07 lb.) 5. Vermilline scarlet 7·11 lbs.
3. Aurin 1·2 lb.	6. Alizarin 2·25 lbs. (20 per cent.)

Further, it shows the dyeing power of the above quantities of each of these colours, all obtained from one ton of coal, viz. :—

1 and 2. Magenta, 500 yards of flannel.
3. Aurin, 120 yards of flannel 27 in. wide.
4 and 5. Vermilline scarlet, 2560 yards of flannel.
6. Alizarin, 255 yards Turkey red cloth.

Lastly, to point out still more clearly these relationships, the dyeing power of one pound of coal is seen in the lowest horizontal column, and here we have a party-coloured flag, which exhibits the exact amount of colour obtainable from one pound of Lancashire coal.

Let us moreover remember, in this context, that no less than ten million tons of coal are used for gas-making every year in this country, and then let us form a notion of the vast colouring power which this quantity of coal represents.

The several colours here chosen as examples are only a few amongst a very numerous list of varied colour derivatives of each group. Thus we are at present acquainted with about sixteen distinct yellow colours ; about twelve orange ; more than thirty red colours ; about fifteen blues, seven greens, and nine violets ; also a number of browns and blacks, not to speak of mixtures of these several chemical compounds, giving rise to an almost infinite number of shades and tones of colour. These colours are capable of a rough arrangement according as they are originally derived from one or other of the hydrocarbons contained in the coal-tar. The fifty specimens of different colours exhibited may thus be classified, but in Table II., for the sake of brevity, only the commercial names and not the chemical formulæ of these compounds is given.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—Prof. Liveing has been appointed Chairman of the Examiners for the Natural Sciences Tripos, and Mr. James Ward of those for the Moral Sciences Tripos. There were 106 candidates for the first part of the Natural Sciences Tripos recently held.

Attention has recently been given to the preservation of University buildings from fire, and serious defects have been, or are being, remedied. Such matters should be carefully thought out in regard to every museum and library, and it is to be hoped that attention will be constantly given to the efficiency of means of prevention and extinction of fires. The report on this subject in No. 636 of the *Cambridge University Reporter* is well worthy of the study of officials concerned in guarding precious scientific collections.

Prof. Darwin will lecture in the Long Vacation on the Theory of the Potential, Attractions, and the Figure of the Earth, the first lecture being on Tuesday, July 13.

A recent discussion of a report by the Special Board on Medicine emphasised the desirability of teaching elementary physics as part of general education to those intending to become medical students, and showed that the new "extra subjects" of the Previous Examination do not satisfactorily secure this, dynamics and a mathematical treatment being required, rather than experimental acquaintance with the physical forces. Mr. Oscar Browning said the interests of education were suffering terribly from the want of agreement as to what schoolboys ought to be taught. Mr. Shaw remarked on the importance of a training in inductive reasoning for medical students, for their whole practice would consist in drawing inductions.

The grants from the Worts Fund to Messrs. Bateson, Seward, Gadow, and Potter, to which we recently referred, have been voted by the Senate.

Prof. Alfred Marshall is giving a prize of 15*l.* annually for Political Economy, to be open to all members of the University under the M.A. degree. The examination is to consist of the papers on Political Economy in Part I., and on Advanced Poli-

[1] See Lectures by Prof. Hofmann, F.R.S., "On Mauve and Magenta," April 11, 1882, and W. H. Perkin, F.R.S., "On the Newest Colouring Matters," May 14, 1869, *Proc. Roy Inst.*; also President's Address (Dr. Perkin, F.R.S.), *Journal of Society of Chemical Industry*, vol. iv., July 1884, on Coal-Tar Colours.

[2] "On the Artificial Production of Alizarine, the Colouring Matter of Madder," by Prof. H. E. Roscoe, *Proc. Roy. Inst.*, April 1, 1870; also Dr. Perkin, F.R.S., "On the History of Alizarine," *Journal Society of Arts*, May 30, 1879.