

NEW NEBULÆ.—M. Stephan publishes positions and descriptions of 100 nebulae discovered at Marseilles in the years 1883-85, in addition to the large number previously detected at that observatory. Not the least notable characteristic of M. Stephan's catalogues is the precision of the places given in them. He mentions that on October 1 and 2, 1882, neither the nebula Dreyer-Schultz 5085 nor *h* 12 were perceptible in the positions assigned to them by the discoverers.

ASTRONOMICAL PHENOMENA FOR THE WEEK, 1885, MAY 17-23

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on May 17

Sun rises, 4h. 7m.; souths, 11h. 56m. 10<sup>s</sup>.; sets, 19h. 46m.; decl. on meridian, 19° 26' N.: Sidereal Time at Sunset, 11h. 29m.

Moon (at First Quarter May 21, 6h.) rises, 6h. 59m.; souths, 14h. 53m.; sets, 22h. 44m.; decl. on meridian, 18° 7' N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury ...	3 37	10 30	17 23	9 41 N.
Venus ...	4 18	12 10	20 3	19 55 N.
Mars ...	3 24	10 36	17 48	13 13 N.
Jupiter ...	11 0	18 15	1 30*	13 38 N.
Saturn ...	5 43	13 51	21 59	22 18 N.

\* Indicates that the setting is that of the following day.

Occultations of Stars by the Moon

May	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
19 ...	$\alpha$ Cancri ...	4	22 52	23 15	48 359
21 ...	B.A.C. 3407 ...	6	0 21	1 12†	125 276
21 ...	35 Sextantis ...	6	20 48	21 18	26 340

† Is below horizon at Greenwich.

Phenomena of Jupiter's Satellites

May	h. m.	Phenomenon	May	h. m.	Phenomenon
17 ...	23 21	II. occ. disap.	21 ...	0 21	I. occ. disap.
19 ...	20 28	II. tr. egr.	21 ...	21 41	I. tr. ing.
20 ...	21 33	III. occ. reap.	22 ...	0 1	I. tr. egr.
	23 10	III. ecl. disap.		22 22	I. ecl. reap.

The Occultations of Stars and Phenomena of Jupiter's Satellites are such as are visible at Greenwich.

May 21, 3h.—Jupiter in conjunction with and 4° 17' north of the Moon.

THE IRON AND STEEL INSTITUTE

THE Iron and Steel Institute met on Wednesday, the 7th inst., when Dr. Percy gave the presidential address. After inviting the co-operation of the members in supplying him with materials for the new edition of his work on "Iron and Steel," and referring to Mr. Lowthian Bell's recent valuable work on the same subject, Dr. Percy drew attention to the existing universal depression, due, in his opinion, to over-production. "Darwinianism prevails in the manufacturing world as it does in the natural world, however painful and unwelcome may be that truth—only the fittest will survive. The struggle may be severe and to many persons disastrous, but so long as supply exceeds demand, it is inevitable, and the result is not doubtful."

In the matter of technical education he regretted that a few of its professed friends should have indiscreetly attempted to imbue all our artisans with the notion that the one thing which at present they urgently need is technical education, and that it will be certain to benefit them all alike, whereas in some trades, such as that of the file-cutter, the marvellous skill which is alike the surprise and admiration of all is to be obtained only by the practice of his art. He referred with pleasure to the judicious and enlightened way in which Sir Bernhard Samuelson, M.P., had advocated technical education in its widest sense, and rejoiced over the liberality of the founders of the Owens College (now the Victoria University) in Manchester, the Mason College in Birmingham, and the Firth College in Sheffield, and of the Whitworth Scholarships, through whose aid scientific instruction is placed within the reach of the artisan class.

The major portion of the address was devoted to the physical and chemical properties of iron and steel, and the learned President's remarks brought out in strong relief the prevailing want of knowledge. How comes it, he inquires, that the force of cohesion should be increased by mechanical treatment, which, *à priori*, might be supposed would tend in greater or less degree to produce disaggregation? Why is iron or steel wire increased in strength by wire-drawing? What is the cause of the physical changes which some metals and alloys have been observed to undergo spontaneously while at rest and under ordinary atmospheric conditions?

"It is not many years since that we had to grope about to discover an analysis of iron ore or of pig iron, whereas now we are actually overwhelmed with such analyses. We are deluged with percentages of carbon, graphitic or combined, of silicon and manganese, of sulphur and phosphorus. We are bewildered by this vast accumulation of material. What is now wanted is the man to reduce it to law and order, to evolve from it principles for our sure guidance. But the problem is so intricate and complex that no common brain can solve it. What are the physical properties of pure iron after fusion? What are the chemical and physical properties of compounds of pure iron and pure silicon in various proportions? What are the modes of existence of manganese, silicon, and phosphorus when present together in pig iron? What is the *modus operandi* of manganese in the manufacture of iron and steel? Why are animal matters or certain other substances rich in nitrogen, required in case-hardening iron? Is any nitrogen or any compound of it imparted to the case-hardened part of the iron? These and such like questions the metallurgist asks of the natural philosopher and chemist, and has failed hitherto to receive a reply."

Having concluded what may be called the technical part of his address, Dr. Percy treated the question of the extent to which the Government of a country should engage in manufacture, and stated "that, if it could be shown that the people as a whole would be benefited by the Government's engaging in manufacture, then the Government was bound to take that course." Treating the various cases of armour-plates, steel for guns, and steel for ship-plates, he showed that in each case, owing to competition, co-operative management, and other causes, private industry was always able to produce articles as good as and cheaper than the Government.

The address was listened to with the greatest attention throughout, both on account of the inherent interest of the matter and the great oratorical skill employed in its delivery. The closing paragraphs are of such universal interest that we quote them verbatim:—

"Everything in this world, nay, there is reason to believe everything in the universe itself, is changing from moment to moment. There is, as I have stated in print long ago, nothing constant but change, however paradoxical that statement may appear. Every drop of rain that falls, for instance, exerts a levelling action on the hills and mountains, and carries down with it in its course to the ocean a minute yet sensible portion of earthy material. In the moral world the like incessant change is going on, and no one can predict what the final result of that change will be. Our globe may, it seems to me, be fitly compared with the laboratory of the philosopher. The one, to our finite understandings, may appear the scene of social and political experiments, just as the other is the scene of chemical and physical experiments. But of this we may be sure, that invariable and irresistible law guides all things, immaterial as well as material. When I reflect on the intricate social problems of the day, the solution of which excites dread in the minds of many, I fancy I see the social molecules, if I may use such an expression, actively at work in rearranging and adjusting themselves to new conditions, and producing results as surprising as they are remarkable. The mysterious forces, whatever they may be, which regulate the movements of those molecules, are as certain in their operation as those which determine the course of the planets in their orbits. Both are equally uncontrollable by the agency of man, and politicians will in vain struggle against them.

"There is a question that must often occur to us, namely, what will Great Britain be when our vast reservoir of material force, coal, is exhausted—a result which many members of the Iron and Steel Institute are doing their utmost to accelerate? The time must come when, in consequence of that exhaustion, Great Britain will cease to be a great manufacturing nation, unless some new source of force should be discovered, which there is