

Australia, twenty-one Giant Toads (*Bufo marinus*) from South America, three Spiny-tailed Iguanas (*Ctenosaura acanthura*) from Central America, a Dark Salamander (*Ambystoma tenebrosum*) from California, two Long-tailed Weaver-birds (*Chera progné*) from South Africa, a Starred Tortoise (*Testudo elegans*), three Bungoma River Turtle (*Emyda granosa*), a Ring-necked Parrakeet (*Palaornis torquatus*) from India, deposited; two Nylghaies (*Boselaphus tragocamelus*, ♂ ♀), four Yellow-billed Liiothrix (*Liiothrix luteus*) from India, a Grison (*Galictis vittata*), a Condor Vulture (*Sarcorhamphus gryphus*, ♂), four Grey Teal (*Querquedula versicolor*, ♂ ♂ ♀ ♀) from South America, two Manchurian Crossoptilons (*Crossoptilon manchuricum*, ♂ ♀), a Bar-tailed Pheasant (*Phasianus reevesi*) from China, a Common Crowned Pigeon (*Goura coronata*) from New Guinea, two White-fronted Geese (*Anser albifrons*), four Bearded Tits (*Panurus biarmicus*), a Waxwing (*Ampelis garrulus*) European, purchased; five Indian Wild Swine (*Sus cristatus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

SIGNALS FROM MARS.—In the *Proceedings* of the American Philosophical Society for December 1901 (vol. xl. No. 167), Mr. Percival Lowell refers at some length to the observations that led to the announcement in the Press that Mars had been signalling to the earth on a night in December 1900. It may be mentioned that the *original* despatch read as follows:—"Projection observed last night over Icarium Mare, lasting seventy minutes." (Signed) "Douglas." In the present paper Mr. Lowell describes in detail some of the individual observations, and points out how the Flagstaff observations of 1894 showed that on general principles the Martian projections were most probably not due to the existence of mountain peaks. A close study of the surface markings led both Messrs. Lowell and Douglas to the result that these several projections were not caused by such permanent surface markings as mountains, but were the effect of clouds floating in the planet's atmosphere. At the opposition of 1894 more than 400 projections were seen in the course of nine months, and since that time other observations have helped to show that the non-reappearances of these projections at such favourable times when, if they were mountains, they should have been seen, have proved their non-permanent character. In fact, permanences like mountains were found to do violence to the observations, and the alternative explanation chosen was something floating in the planet's atmosphere and capable of reflecting light, or, in other words, clouds. Mr. Lowell, in his concluding remarks, says that the surface marking, Icarium Mare, is undoubtedly a great tract of vegetation, and the observation of December is completely explained if it be assumed that a cloud was formed over this region and rose to a height of thirteen miles, and then, travelling east by north at about twenty-seven miles an hour, passed over the desert of Aeria and there was dissipated after an existence of three or four days. The Flagstaff observations thus tell us that mountains on Mars, if there be any, have still to be discovered.

THE ORION NEBULA AND MOVEMENT IN THE LINE OF SIGHT.—Prof. H. C. Vogel communicates to the *Sitzungsberichte der Kön. Preuss. Akad. der Wissenschaften zu Berlin*, March 13, an account of the results which he and Dr. Eberhard have obtained with reference to the measurements of the spectrum of the Orion nebula taken for the determination of motion in the line of sight. The instruments used were the photographic refractor of 32.5 cm. aperture and 3.4 metres focal length, and a spectroscope with three prisms, the latter being supplied with electrical heating for maintaining a constant temperature during the time of exposure; the comparison spectrum was that of iron in every case. The measurements of all the photographs were made by Prof. Vogel and Dr. Eberhard independently of each other, and the region of the nebula investigated was practically the same as that examined by Prof. Keeler in 1890 and 1891, so that a direct comparison with his results can be made. The following table shows the values of the velocities in kilometres per second relative to the sun obtained from measurements at different parts of the H γ line.

	Vogel. Km.	Eberhard. Km.
Position angle 90° from star θ' Orionis $\Delta=0^{\circ}8$; beginning of H γ line ...	+16 ...	+17
At θ'	+16 ...	+16
Position angle 270°; $\Delta=0^{\circ}6$ most intense portion of H γ line ...	+12 ...	+11
Position angle 270°; $\Delta=1^{\circ}2$ to 1^{\circ}4 near end of H γ line... ..	+8 ...	+12

The mean velocity relative to the sun obtained by Keeler, who used the H β line, was $+17.7 \pm 1.28$ kilometres, a value not very much removed from the above-mentioned determination.

Another interesting point obtained from a close examination of the H γ line was the distinct irregularity or hump of this line in the nebula spectrum, and both Prof. Vogel's and Dr. Eberhard's measures give velocities relative to the sun of +6, +28, +11 and +6, +41, +28 respectively to three chosen points on this line. It is pointed out that the measurements were difficult, and on account of the faintness of the line probably not very accurate. Keeler, however, looked for relative motion in the nebula itself, and came to the result that from his observations there were shifts which indicated relative motion in the nebula amounting to 21 kilometres per second, and in the brightest part of the nebula shifts corresponding to a third of this amount were detected. It may be mentioned also that Sir Norman Lockyer, in his communication to the Royal Society (*Phil. Trans.*, 1895) on the spectrum of the Orion nebula, obtained evidence of internal motion in the nebula in the distortion of the lines 4471 and 4495. These lines were found to be sharply bent, whilst the others remained straight. Unfortunately, only one photograph was secured, and it was suggested that in the absence of others it was possible that this displacement might have been due to a distortion of the photographic film. There seems little doubt, therefore, that these deformations and anomalies of the H γ lines observed at Potsdam are real indications of relative motion in the nebula itself, and the values for the velocities given will perhaps be more accurately determined when further photographs have been secured and measured.

THE RELATIONS BETWEEN METALLURGY AND ENGINEERING.¹

THE lecturer stated that this was the subject with which the council had requested him to deal in his lecture, but it must not for a moment be imagined that the metallurgic art was not included in the wide range covered by the Institution, which had, from its earliest days, given prominence to the work of metallurgists. He quoted Mr. G. P. Bidder, who, in his presidential address to the Institution delivered in 1860, said "that if he were called upon to define the object and scope of the profession of civil engineer, he would say that it was 'to take up the results discovered by the abstract men of science and to apply them practically for the commercial advantage of the world at large, and to diffuse their beneficent influence among all classes of his fellow citizens.'" He hoped to be able to show that metallurgists practising an industrial art had helped the engineer to do this, and in evidence that such was the case, he quoted from the presidential address of Sir John Fowler, words to the effect that engineers had been more assisted by members of the Institution and by distinguished men of science generally in relation to iron and steel than as regarded any other material. It was in connection with iron and steel that the illustrations of the lecture would be mainly given. It might at first be thought that the relations between metallurgists and engineers, which had become so close and enduring, arose quite simply from common interest. The case was, however, far from being so simple; communication between those who extracted metals from their ores and adapted them for the use of the engineers, who actually employed metals in construction, was seldom, at the outset, quite direct. The relations with which the lecture dealt had been strangely stimulated by the intervention of men who, in many cases, were neither engineers nor metallurgists, but were men whose lives had been devoted to

¹ Abstract of the tenth "James Forrest" Lecture, delivered by Sir W. C. Roberts-Austen, K.C.B., F.R.S., at the Institution of Civil Engineers on April 22.