

requiring for their due execution scientific and refined processes and the superintendence of scientific men of high qualifications, are yet, properly speaking, rather applications of scientific views and acquired skill to particular objects of national importance, than undertakings of research having in view as their primary object the advancement of science itself. It is true, that as practice makes perfect, science *does* gain by such applications, and that by going somewhat out of the way in their execution, and seizing opportunities, most valuable theoretical results and data are occasionally elicited at an additional cost incomparably less than would be incurred by instituting operations for the purpose *ab initio*. But when I consider the pregnant nature of scientific truth, and how upon occasion of every well-grounded accession to, or extension of, theoretical knowledge, a *new practice* has arisen founded thereon, and old methods have been abandoned as *inefficient* and *uneconomical* in comparison, I should feel prepared to advocate or defend a very large and liberal devotion indeed of the public means to setting on foot undertakings, and maintaining establishments, in which the investigation of physical laws and data should be the avowed and primary object, and practical application the secondary, incidental, and collateral one.

"This, however, has hitherto been the fortunate lot of Astronomy only. And the result has been, *not only* the establishment of a complete theory—*not only* the perfection of nautical tables and observation—but an universal impulse given to every other branch of exact inquiry—a higher standard erected everywhere, a precision in every determination rendered practicable, which would have never before been dreamed of as attainable without the requirements of Astronomy. Is it hoping too much that the day may not be far distant when Physical Science in all its exacter branches shall participate in these advantages, and when the establishment of 'Physical Observatories' in our own and distant lands shall give that impulse to many other sciences (as for example Magnetism, Meteorology, &c.) of which they stand so much in need?" "J. F. W. H."

Trade Winds

MAURY, in his "Physical Geography of the Sea," maintains that the surface trade wind of the northern hemisphere becomes the upper counter current of the south, and *vice versa*. That the trade winds, in fact, cross each other so—

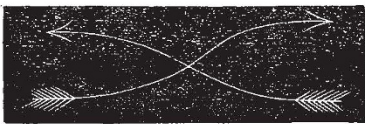


FIG. 1.

instead of meeting and turning back over themselves so—



FIG. 2.

Subsequent writers on physical geography have repeated this statement without apparently reflecting on its extreme improbability.

Maury's arguments for this strange theory are partly connected with the hygrometric state of certain of these currents, partly with terrestrial magnetism, and partly with the nature of the air-dust. It would take up too much of your space to discuss these points fully. The arguments founded on terrestrial magnetism are, however, purely hypothetical and very fanciful. Those on the hygrometric state of the currents are not very convincing. It is, however, to the latter of Maury's arguments I wish to draw your readers' attention. Maury seems to believe in this almost incredible direction of the air currents because Ehrenberg identified certain South American infusorial forms in

the red dust which often falls at sea near the West Coast of Africa and in South Europe. Did Ehrenberg simply identify certain South American forms in the dust, or did he identify the dust as South American on account of the presence of these forms? If the former, the argument goes for little; South American forms may be found in Africa also. If the latter, then a new difficulty arises. Every microscopist knows the curious diversity of infusorial forms in all climates at all similar. It would be the height of presumption even to question the conclusions of Ehrenberg in microscopy; and yet to be able to identify infusorial forms in such a way as to say that dust containing them comes from such and such a locality is certainly very wonderful.

Maury, from some of his remarks, does not seem to be fully alive to the utter inconsistency of his theory with what we know of the laws of fluid motion. That two broad flat rapid currents should encounter or flow into the same rising current and then cross through each other in alternate strips, or *curdles*, as Maury calls them, is scarcely within the bounds of physical possibility. On the other hand, Maury's opinions are certainly entitled to consideration, and this is one which he found with so much deliberation, and entertained so firmly, that I should gladly learn what competent physicists of the present day think of it.

Graeff Reinet College, Nov. 13

F. GUTHRIE

The Arctic Expedition

THE absence of sunlight during the Arctic winter is said to have an injurious effect on the health of both men and dogs; yet it does not appear that the best substitute for solar light has ever been employed for illuminating purposes during the dark season. It occurs to me that the occasional use of the electric-light would be likely to mitigate the evils due to the absence of solar radiation, and the constant use of oil lamps. If Gramme's electro-magnetic apparatus could be conveniently used on board ship, it would appear to offer the additional advantage of giving employment to the men at a time when it is difficult to find occupation for them.

Dublin, Feb. 23

R. J. MOSS

Herapath's Balance

CAN any of your readers inform me whether Herapath completed his balance, in which he suspended the beam from a magnet; also whether the idea was taken up by balance makers? He gives an account of this form of balance in a paper dated 1821.

E. W. P.

OUR ASTRONOMICAL COLUMN

THE BINARY STAR μ^2 BOOTIS.—Dr. W. Doberck, of Col. Cooper's Observatory, Markree Castle, Sligo, has communicated to the Royal Irish Academy, and also published in *Ast. Nach.* No. 2026, an orbit of this binary founded upon a very complete discussion of the measures from 1782 when the duplicity was detected by Sir W. Herschel, to 1873. The resulting period of revolution is 290 years, and the true peri-astron passage is found to have occurred about 1863.5. Dr. Doberck does not append an ephemeris of angles and distances according to his orbit, but we supply them for the next eighteen months for comparison with any measures that may be made in the interval:—

1875.25	Angle 144° 79	Distance 0".632
75.75	" 142.83	" 0.634
76.25	" 140.89	" 0.637
76.75	" 138.96	" 0.640

FALB'S NEW VARIABLE IN ORION.—The star to which reference was made in NATURE last week, appears to be the preceding component of the double star Σ 747, or that which was the smaller star during Struve's measures 1825-36. Herr Falb has given some particulars relating to this object in No. 2,026 of the *Astronomische Nachrichten*, but we suspect he has inadvertently reversed the order in which the magnitudes of the Dorpat Catalogue should be assigned. Struve's mean is

1833.59	Angle 223° 06	Distance 35".85
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