

errors in Dr. Tyndall's popular works; and to join the too thin ranks of those who, like Mr. Sedley Taylor, are not to be imposed upon by a popular reputation—but venture to think for themselves and to give the public the benefit of the result.

8. Opportunities for such public warning have never been wanting, but now they are so numerous that a long essay would be requisite to do justice to them all.

In the meantime, as an example or two, I may call attention to the way in which Sir Charles Wheatstone, and (by implication) Sir William Thomson, and others, some of whose splendid scientific labours have had the misfortune to become profitable in a pecuniary sense, are treated in Dr. Tyndall's "Lectures on Light," just published. The contrast between the utter contempt for money shown by their censor, and the (implied) opposite which is condemned as unworthy of scientific men, is brought out with all the flow of word-painting and righteous indignation which Dr. Tyndall so abundantly possesses. Besides, the monstrous doctrine is inculcated that men who devote themselves to practical applications are men incapable of original research.

9. But, to conclude for the present, I would simply call attention to the following passage, which comes from an author who in the same work treats of the relative merits of such giants as Young and Fresnel. What confidence can one have in the accuracy of any statement on a scientific matter made by the author of it?—

"And here we may devote a moment to a question which has often been the subject of public discussion—whether, namely, a rainbow which spans a tranquil sheet of water is ever seen reflected in the water? Supposing you cut an arch out of pasteboard, of the apparent width of the rainbow, and paint upon it the colours of the bow; such a painted arch, spanning still water, would, if not too distant, undoubtedly be seen reflected in the water. The coloured rays from such an arch would be emitted in all directions, those striking the water at the proper angle, and reflected to the eye, giving the image of the arch. But the rays effective in the rainbow are emitted only in the direction fixed by the angle of 41° . Those rays, therefore, which are scattered from the drops upon the water, do not carry along with them the necessary condition of parallelism; and, hence, though the cloud on which the bow is painted may be reflected from the water, we can have no reflection of the bow itself."—"Lectures on Light," p. 25.

If Dr. Tyndall, with the assistance of his scientific advisers, fails to see the justice of my remark on this passage, perhaps you will permit me to make it the text of a little essay in a future number.

I have all along said, and still say, that I cordially recognise the services of Dr. Tyndall in popularising certain parts of Science. But his readers must be cautioned against accepting as correct great parts of what he has written. It is granted to very few men to do this useful work without thereby losing their claim to scientific authority. Dr. Tyndall has, in fact, martyred his scientific authority by deservedly winning distinction in the popular field. One learns too late that he cannot "make the best of both worlds."

I would request Dr. Tyndall for his own sake, not for mine, should he favour me with a reply, not to pick out one or two isolated passages of a letter, which absence from books may possibly have rendered slightly inaccurate—but to answer me, as he has not answered Forbes, in the full spirit and not in the partial letter.

St. Andrews, Aug. 20

P. G. TAIT

W. S. J. on Hegel

I RESPECTFULLY request admission, into an early number of NATURE, for an explanatory word or two, in reference to W. S. J.'s review of my poor book on Law, &c., in the valuable publication named, for July 24, 1873.

W. S. J.'s very first sentence speaks of the said little book as containing "a discussion of Hegel's opinions concerning gravitation and the differential calculus." In the first place, Hegel has nothing to say against either gravitation as a fact, or the differential calculus as an established method of indubitable scientific calculation: he would only attempt to philosophise both by placing metaphysical principles under them. Now this is part of Newton's own action, and he certainly would not object to any attempt, Hegel's or other, in the same direction. In the second place, I discuss no opinion of Hegel in this reference: I only attempt to expose erroneous opinions of Hegel's relative

opinions. To this I strictly confine myself, and this goes much deeper than the reader may, at first, think.

On Law, whatever is said by W. S. J., concerns only the old difficulty of Hegel's *dialectic*; and perhaps the italicising of this word, together with my own intellectual deficiencies, may be respectfully offered in explanation of as much. W. S. J. here, then, is evidently misintelligent himself, and, accordingly, only speaks so as to induce misintelligence in others. Nevertheless, it is worth saying that the reader may or may not gain from the particularity of satire in W. S. J.'s hands—so keen is it that it crows, and, again, so kindly that it disconcerts.

Mathematically, according to W. S. J., "the critical statement of the necessary outcome of Hegel's philosophy," reduces itself to this, that the principle in question is placed "in that in which the quantum has disappeared, and there remains the relation only as qualitative relation of quantity." W. S. J. has for this only the mildly-authoritative contempt of a duly-elevated position; and when it is said "What is called infinitely little is only qualitative, and is neither little nor great, nor quantitative at all," he at once squelches all by an "on the contrary!" Now all this condemned matter comes directly, not from Hegel, but from Newton; for the former, quoting from the latter, says:—

"These (N.'s increments and decrements) are not to be taken as particles of a definite magnitude (*particula finite*). Such were not themselves moments, but magnitudes, generated out of moments; what is to be understood, rather, is the principles or beginnings (elements) of finite magnitude;" that is, plainly, what is concerned lies "in that in which the quantum has disappeared as quantum, and there remains the relation only as qualitative relation of quantity."

What concerns comets is naively amusing. We have not had to wait in their regard (as W. S. J. seems to think) for the information of "Chambers' Handbook." The astronomers of the last century, as it appears, were able to speak better than even the "Handbook." Comets that return, they say, though after a great many years, travel in ellipses of enormous axes; whereas those that do not return may describe parabolas or hyperbolas. Such is the opinion of Science yet, though it may talk of many other explanations of non-return, as dissipation, interception, &c. This, I say, is how Science looks yet; but W. S. J., for his part, is under the belief that Science has actually within its ken comets that (so to speak) *revolve* in hyperbolas, as well as others that revolve in ellipses. (Positively such seems his idea. Now, Hegel is never once at fault here—in his own way, I mean; for whether in ellipse, in parabola, or hyperbola, Hegel's assignation of the moment of singularity to the comet is, on his own principles, justifiable. May not a non-returning comet, too, be attributed to that contingency which is, and must be, inherent in externality as externality? On the whole, it may be well for us all to let comets alone yet. Our greatest living authority can only philosophise them into stone-rattles which the sun (for his amusement?) whirls about his head.

One has only to consider these things and others the like—the exquisite little gibes, not forgotten, about a secret in two volumes and a secret in fifteen pages, &c.—to perceive that what we have here is only once again the blind rush of prejudice from its usual dark corner of relative ignorance—an ignorance which it will persist in, and not (through study) convert into the light of day. There is that approbative allusion to Mr. Smith, too; W. S. J. will yet be ashamed of that.

On the whole, however, I hope I have not spoken disrespectfully, for I cannot fancy who W. S. J. may be. He talks of law and logic, and is possibly a lawyer; he certainly has a profound contempt for "Hegel and his satellite Stirling;" but were he (what his initials may indicate) "the eminent Jagers" himself, I cannot, whatever his power of *practice*, admire his capacity for *principles*.

Edinburgh, July 28

J. HUTCHISON STIRLING

Lakes with two Outfalls

IN NATURE, Aug. 14, a paper under this heading concludes thus:—"Colonel George Greenwood, who is, I presume, the same as the former active correspondent about this subject, visited this lake (Lesjeskaugen) last summer, as appears from the entry of his name in the day books. I am not aware that he has since published any opinion, but the lake seems, so far as I can judge, to support his view of the matter.—W. Stanley Jevons." I sent an account of my visit to Lesjeskaugen Lake