Titchener and myself *apropos* of his article in SCIENCE for December 23d (Vol. VIII., p. 897).

Messrs. Lehmann and Hansen had sought to show experimentally that the results of certain experiments by Professor H. Sidgwick, which the latter had ascribed to 'thought-transference,' were really due to involuntary whispering by the agent, overheard hyperæsthetically by the subjects. Professor Titchener closed his article by saying: "The brilliant work of Messrs. L. and H. has probably done more for scientific psychology than could have been accomplished by any aloofness, however authoritative."

To these words I, in your next number, took exception, saying that if Professor Titchener would read Sidgwick's and my criticisms of the work of the Danish investigators, he would probably agree 'that, owing to the fewness of the data which they had collected, they entirely failed to prove their point.' I, consequently, called their essay 'an exploded document'; to which my 'scientifically-minded' *confrère* rejoined (in SCIENCE for January 6th) that he had carefully read the criticisms, and had thus seen us 'handling the fuse,' but that he had 'not yet heard the detonation.'

As the explosion was so audible to me, the disproof being quasi-mathematical, I was astounded at this hardness of hearing in my colleague; and, to make sure that I was not a victim of auditory hallucination, I wrote to Professor Lehmann to know what he himself thought of his conclusions, in the light of the criticisms in question. His answer, somewhat belated, just arrives.

He says: "Your own as well as Professor Sidgwick's experiments and computations prove, beyond a doubt, that the play of chance had thrown into my hands a result distinctly too favorable to my theory, and that the said theory is consequently not yet established (*bewiesen*)."

This is identically Professor Sidgwick's and my contention; and for his candor, as well as for his willingness to take pains to experiment in this region, Professor Lehmann deserves to stand high as a 'psychical researcher.'

Professor Titchener, meanwhile, still hugging the exploded document, wanders upon what he calls 'the straight scientific path,' having it apparently all to himself. May the consciousness of his fidelity to correct scientist principles console him in some degree both for his deafness and for his isolation.

WILLIAM JAMES.

CAMBRIDGE, April 20, 1899.

TWO CORRECTIONS.

MY attention has just been called to this paragraph in SCIENCE, June 3, 1898, p. 784, foot of column two:

"*Erratum:* In the review of Wilder's System of Nomenclature, p. 716, col. I, line 5, for 'chippocamp' read 'hippocamp.'"

This prompt public correction renders needless and unjust the commentary upon the subject in my address last December before the Association of American Anatomists (*Proceedings*, p. 33, and SCIENCE, April 21, 1899, p. 577), and I deplore my non-acquaintance with it up to the present time. Since none of those who heard my address reminded me of the 'Erratum,' it seems to have been overlooked by them also.

In this connection may properly be corrected a typographical error in the address itself (*Proceedings*, p. 16, and SCIENCE, April 21, 1899, p. 566, note, title 6); the date of publication of the 'Review' in SCIENCE should be May 20th, not 28th.

These corrections will be incorporated in the *Proceedings* and sent to those who receive copies of SCIENCE from me.

B. G. WILDER.

ITHACA, N. Y., April 26, 1899.

[It may be explained the typographical error referred to above was not due to any oversight on the part of the writer of the review. An inverted comma (') was inserted in the proof before hippocamp, which was mistaken by the printer and the proof reader for a *c*.—ED. SCIENCE.]

NOTES ON PHYSICS.

A NEW THEORY OF THE ZEEMAN EFFECT.

DURING the last eight or ten years Goldhammer has published at intervals in *Wiedemann's Annalen* a series of papers dealing with the electro-magnetic theory of light, and espe-

cially upon the transmission of light through ordinary media. The chief difference between his treatment of the subject and the classical one of Maxwell lies in the fact that Goldhammer considers what are usually called the *constants* of the medium, the specific resistance or the dielectric constant, for instance, not to be *constants*, but to be *functions of the wave frequency, developable in power series.* It may be remarked that this view receives a certain amount of support from the researches of Blondlot and J. J. Thomson, which show that the dielectric constants of certain materials do depend upon the frequency.

Developing mathematically the preceding hypothesis, Goldhammer arrives at very general equations for the velocity and absorption of light in a given medium. It is worthy of remark that the formulas given by Helmholtz, Sellmeier and Lommel can all be considered as special cases of that of Goldhammer and can be derived from it.

In *Wied. Ann.*, No. 3, Band 67, Goldhammer applies the theory which has just been sketched to the Zeeman effect, and thus obtains a new theoretical explanation of the phenomenon. Considering the absorption spectra first, he shows that any alteration in the specific constants of the medium will cause a change in the position of the absorption lines. He then assumes that the magnetic field does cause such an alteration in these quantities; in support of this assumption, he calls attention to a paper by Bolzmann (*Wied. Ann.*, 31, p. 789), in which it is shown that a magnetic field increases the resistance of a gas placed in it.

Kirchoff's laws allow one to pass from the absorption spectrum to that of emission. Then in a bright-line spectrum the effect of a magnetic field is to cause displacements in the lines and might give rise to doublets and triplets.

In order to account for the polarization phenomena, Goldhammer makes a further assumption that the magnetic field causes the medium to become æleotropic and double-refracting. The circular polarization of the doublets, when viewed along the lines of force, is very closely connected with the well-known magnetic rotation of the plane of polarization.

It will be noticed that this theory of Goldhammer's differs materially from those proposed by Lorentz and Larmor. Goldhammer makes the whole of the phenomena depend upon changes in the medium, while Lorentz and Larmor attribute them to the electrodynamic forces developed by the motion of electrified ions in a magnetic field.

At present it seems that the ionic is the more promising of the two theories, since it gives an explanation, incomplete it is true, of the complexity of structure of the lines and of their polarization. The numerical value of the ratio between the mass of a vibrating ion and the charge carried by it as derived from the Zeeman effect is in good agreement with that obtained by J. J. Thomson from the phenomena of cathode rays.

DAYLIGHT-PHOSPHORESCENCE.

Mourelo (*Comptes Rendus*, t. CXXVIII., p. 557) has made the curious discovery that sulphides of strontium, calcium, barium and zinc, prepared in a particular way, show much more brilliant phosphorescence after exposure to diffused daylight than they do after exposure to direct sunlight, and, further, that periodic exposure to diffused daylight increases very remarkably the power of phosphorescing. After being brought to this sensitive state one phosphorescing portion is able to excite phosphorescence in another non-luminous portion either when the two portions are in contact or when they are contained in separate glass tubes.

A. St.C. D.

NOTES ON INORGANIC CHEMISTRY.

An analysis of the water of the Great, or Illecilliwaet Glacier, British Columbia, has been published in the *Chemical News* by F. T. Shutt and A. T. Charron. The waters were taken a few feet from the face of the glacier, and were of characteristic turbid or milky appearance. Analysis showed water of great organic purity, the free ammonia being 0.018 parts per million; albumenoid ammonia 0.027 to 0.037; nitrogen as nitrates and nitrites 0.0246 to 0.0442; chlorin 0.1; solids 12 to 30.8. On sedimentation the waters became perfectly clear, and microscopic examination of the deposit showed