molecule in space, and hence, in finding the total components in these directions, we have to add the intensities, not the amplitudes. A fluid consisting of anisotropic molecules oriented at random must therefore necessarily scatter unpolarised light in proportion to its density, and as remarked in my letter in NATURE of March 31, p. 428, considerations similar to those which enter into the Lorentz refraction formula introduce a further factor $(\mu^2+2)^2/9$, which increases the unpolarised scattering to be expected. The whole question will be found elaborately discussed in a paper by Mr. Ramanathan in the Proc. Indian Association for the Cultivation of Science, vol. viii., Part I., just published.

I think I should make it clear that the suggestion made in my letter in NATURE, March 31, and endorsed with some modifications by Sir William Bragg, regarding the relations between the liquid and the crystalline states, is very different from that put forward by Prof. King. In my opinion, neither the facts regarding the scattering of light nor the X-ray data require the assumption of the existence of crystalline aggregates in liquids. All that the experimental facts suggest is that the molecules in a liquid influence the orientations of their nearest neighbours to a sensible extent, and that this results in the amount of unpolarised light scattered being somewhat smaller than on the hypothesis of random orientations of the molecules.

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June 15.

The Doublet Separations of Balmer Lines.

IN his theory of the structure of the lines of the Balmer Series based on the principle of relativity, Sommerfeld shows that each of the members of the series should consist of a doublet and that each of the components of these doublets should possess a fine structure. The calculations show besides that the frequency difference for these doublets should be constant over the whole of the Balmer Series and should be equal to 0·36 cm^{-1}. For H_α the separation should perhaps be slightly less. As the theory applies equally well to the doublets of the corresponding series in the spectrum of positively charged helium, these were investigated by Paschen and were found to have separations that lead to a value of $0·3645 \pm 0·0045$ for the frequency difference of the doublets of the Balmer Series.

Since the publication of Paschen's work on helium a number of investigators, including the writer, have attempted from the measurements on the separations of H_α and H_β and in some cases of H_γ and H_δ to look for evidence that would lead to a confirmation or rejection of Sommerfeld's theory. Up to the present the results obtained could not be considered as satisfactory. There was a lack of agreement in the values obtained for the separations by different investigators, and on the whole the values obtained were less than that demanded by the theory. In the case of the observations made by myself and Mr. Lowe on the separations of H_γ and H_δ, values were obtained that seemed to point in the direction of a steady decrease in the frequency differences as one passed to the higher members of the series.

At my suggestion the matter was re-investigated recently by one of the research workers in the Physical Laboratory of the University of Toronto, Mr. G. M. Shrum. In his experiments the tubes were of a special design and were cooled with liquid air.

His method of operating these tubes, which will be described later in his own paper, enabled him to eliminate practically the whole of the secondary spectrum and thus permitted him to include in the measurements of the doublet separations that of H_ϵ as well as those of H_α H_β H_γ and H_δ.

The results are the following :

Line.	Wave-length.	Separation of the Components.		Probable Error.
		$\delta\lambda$.	$\delta\nu$.	
H_α	6562·79 Å	0·143 Å	0·33 cm^{-1}	0·02 cm^{-1}
H_β	4861·33 ,,	0·085 ,,	0·36 ,,	0·01 ,,
H_γ	4340·46 ,,	0·070 ,,	0·37 ,,	0·02 ,,
H_δ	4101·73 ,,	0·061 ,,	0·36 ,,	0·02 ,,
H_ϵ	3970·07 ,,	0·055 ,,	0·35 ,,	0·02 ,,

It will be seen that as far as the doublet separations are concerned, they afford a striking confirmation of Sommerfeld's theory.

J. C. MCLENNAN.

The Athenæum,
July 2.

"Guide to the Mollusca."

WITH reference to the review of the "Guide to the Mollusca" in NATURE of July 21, p. 93, may I be allowed to point out that our rather cautious statement, "A species of *Helix* has been said to tolerate a temperature of −120° C.," was based on Pictet's paper "De l'emploi méthodique des basses températures en biologie" (Arch. Sci. Phys. et Nat. Genève (3) xxx., 1893, pp. 293-314). The reviewer's remark about the scientific names of the pearl mussel and the pearl oyster scarcely makes it clear that we are simply keeping to the names used by the late Mr. E. A. Smith in 1908, *Margaritana margaritifera* for the mussel and *Margaritifera margaritifera* for the oyster. I hope that the other errors he has discovered are not more serious than these.

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July 23.

MR. REGAN is quite right to direct attention to the fact, which I should have noted, that the confident statement in the text-book concerning the survival of a species of Helix submitted to a temperature of −120° C. had been altered from "has been known" to "has been said," but I still think it would have been better to have omitted it altogether. Pictet in his paper does not say whether the degrees he cites were registered by any one of the more usual thermometers or by a scale of his own (the "C" is an addition in the text-book), and his paper altogether does not suggest that amount of accuracy which the subject demanded. The admission that a system of nomenclature nearly a quarter of a century old has been deliberately adhered to in a work supposedly brought up-to-date, speaks for itself. Much progress has been made in this section of systematic zoology since 1908, and according to all the Rules the pearl oyster (Pinctada) has no right to the name Margaritifera, which belongs to the pearl mussel. There are other examples in the "Guide" of what a malacologist of to-day would call misnaming.

THE REVIEWER.