whereas the material on which his experiments were carried out was xylonite or celluloid containing at least a fifth of its weight of camphor and rather more than that proportion of camphor by volume (Phil. Trans., A, vol. 221, pp. 139-162). Another old friend and teacher, Prof. Filon, in a paper which he and Mr. Jessop published on the stress-optical effect in transparent solids strained beyond the elastic limit (Phil. Trans., A, vol. 223, pp. 89-125), after deducing the existence in xylonite of a mixture of two materials with different elastic and plastic properties (page 112), speaks in his summary (paragraph (2), page 123) of "nitrocellulose under simple tension." The distinction between xylonite and nitrocellulose in this relation is really important, as it is probable that the elastic and stress-optical properties of nitrocellulose alone would be markedly different from those of xylonite.

Mr. Garnett refers to celluloid as the basis of photographic film. This is true, but photographic film is quite different in its composition from celluloid in the more massive form, such, for example, as was used by Prof. Coker and Prof. Filon. Not only is the nitrocellulose in celluloid film more highly nitrated, but the proportion of camphor is smaller. Even celluloid film, however, does not contain nitrocellulose so highly nitrated as to correspond with what used to be called cellulose trinitrate. This would contain 14·1 per cent. of nitrogen, while the nitrocellulose in cinema film usually contains from 12·0 to 12·5 per cent. of nitrogen. Lastly, having supervised the manufacture of a certain amount of a substitute for celloidin during the War, I should naturally agree that it is a carefully purified product, but I should not like to say that it approaches to a single chemical substance.

The analysis of celluloid, provided the camphor used in its manufacture is optically active, is not exceedingly difficult and can be carried out with moderate accuracy, and it would add greatly to the ultimate value of physical measurements made with the material if its composition were always given. In the instance which forms the subject of Mr. Garnett's criticism, one would like to know not only the chemical characteristics of the nitrocellulose used, but also as many physical properties as possible, more especially perhaps the fluidity-concentration curve in two or more chosen solvents. It is greatly to be desired that all researches on colloid materials should seek to correlate at least two different properties.

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Essex, January 13.

The Need for a Universal Language.

I READ President Coolidge's address and Prof. Gardner's letter on this subject in the *Times* of November 21, 1923, and, now, your report of Prof. R. G. Kent's article (NATURE, January 3, p. 23), with interest, but there are two points connected with the matter to which attention may usefully be directed. One of the principal causes of the neglect of Latin and Greek in schools is the world-wide recognition of the importance of a knowledge of the so-called "modern languages." This is a blind argument. It is as if a student, desiring to acquaint himself with the contents of the top shelves in a library, deliberately ignored and neglected the ladder by which they are reached, and tried to get at them by jumping. Those who are old enough to have been at school in the days of compulsory Latin and Greek amply realise the enormous value of even an almost forgotten grounding in the classics, in the acquisition of any foreign language—this point requires no labouring. I wish to point out the great value of having at some time been taught the phonation of an unfamiliar text, like Greek, when one comes in later life to study any Oriental language—or, for obvious reasons, Russian. The mind is no longer terrified by the aspect of unknown characters, and thus the first great, and often repellent, difficulty is recognised as being really of little account.

A still more important point arises in connexion with the periodically recurring agitation for a "Universal Language." The obvious fallacy of founding such "languages" as Volapuk, Esperanto, Ido, and the others upon the native language of their protagonists requires no argument. The result is that each country pleads for its own universal (?) language, and we are back again where we started from.

But Latin is, and always has been, *the* universal language. Its claims are fully set forth in the report of the Committee of the British Association (1921, p. 390). I cannot, however, agree with the "Conclusion" of the Committee. Down to, and even in, modern times, knowledge intended to be of world-wide distribution has been, and is, conveyed in Latin—and the worse the Latin is, the easier it is to understand. I am not one of those who plead the rarefied joy of reading the great Latin authors in the original tongue—we have not the time, and existing translations are amply satisfactory—but we do want a language of universal intercommunication, and the appalling Latin of the Roman Church (cf. the Bollandists' "Lives of the Saints") is entirely sufficient for the purpose. I have proved this in many obscure corners of the world, using a doctor, chemist, priest, or librarian—any one in a black coat, in fact—as an interpreter.

If this were once realised and recognised, I see no reason why within a short time one may not ask of any wayfarer in a Magyar town:

"Quae est via ad vapor-stationem?"

And receive the reply: "Primus ad dextram et tunc tertius ad sinistram."

Atque Felix semper ambulabat.

(O, Shade of Arnold!)

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Balfour Stewart's Advances in Radiation Theory.

THE extremely interesting notes by Sir Arthur Schuster in a recent number of NATURE (January 17, p. 87) may possibly leave with the ordinary reader an impression that Balfour Stewart's contributions to the establishment of the laws of natural radiation were slighter than was actually the case. The considered opinion of the late Lord Rayleigh, set out in *Phil. Mag.*, i. 1901, pp. 98-100, or "Scientific Papers," iv. pp. 404-5, can hardly be gainsaid. In Stewart's discussion of radiation in an isolated enclosure containing moving bodies, his expressed conviction, that the second law of thermodynamics is only satisfied through the action of mechanical forces necessary to maintain the motion, is only turning round the other way the considerations employed by Boltzmann and by Wien long after, who by means of these mechanical forces (namely, the reaction of radiation pressure) combined with the second law of thermodynamics, deduced the law of structure of natural radiation. Reference may also be made to footnotes appended to the reprint of Stokes's cognate papers in "Math. and Phys. Papers," iv. especially p. 136.

JOSEPH LARMOR.

Cambridge, January 16.

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