upon friction in capillary channels, and must lead to rotational motion, not only in the absorbing material but also throughout a thin layer close to the surface; and in the presence of rotational motion there can exist no velocity potential.

As a similar phenomenon, the Prandtl boundary layer in aerodynamics may be cited. Although at some distance from an airfoil the motion of the air is well represented by potential theory, yet in the immediate neighbourhood of the surface the potential theory fails to give even a rough approximation to the actual motion. It is to the failure of the fluid to maintain irrotational (potential) flow in the neighbourhood of the surface that the whole lift and drag of an airfoil is to be ascribed.

It seems probable that an adequate theory of sound absorption must contain as an essential part a thin layer of air in rotational motion.

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Influence of Nitrogen Dioxide upon the Ignition Temperature of Hydrogen-Oxygen Mixtures.

MR. H. J. SCHUMACHER has proposed (NATURE, July 26, p. 132) an explanation of the explosive action of nitrogen dioxide in hydrogen-oxygen mixtures at temperatures in the neighbourhood of 380° C. The ignition occurs according to Thompson and Hinshelwood between sharply defined limiting pressures of nitrogen dioxide. Schumacher's explanation is based upon the assumed competition of the following two reactions:

(1.) $NO_2 + O = NO + O_2$ (+51 cal.)
(2.) $H_2 + O = OH + H$ (+8 cal.)

It is assumed that the oxygen atoms are produced from nitrogen by collisions with 'hot' molecules. Photochemical production of even greater numbers of oxygen atoms [1] than could originate in this way has been found unable to cause explosions at temperatures at which nitrogen dioxide in the correct concentrations is effective. On the other hand, the formation of water in the region immediately outside both limiting concentrations falls to negligible values, in contradiction to that which would be expected from the mechanisms (1) and (2).

The whole phenomenon is to be attributed to a process occurring at the wall of the reaction chamber [2] where the so-called non-stationary explosions are stimulated by very small quantities of nitrogen dioxide added to the gas and hindered by greater additions which poison the surface.

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July 31.

[1] *Die Naturwissenschaften*, p. 266, 1930, and p. 443, 1930; also Vortrag: Bunsen Tagung, Mai, Heidelberg, to appear shortly in *Zeitschrift für Elektrochemie*.
[2] H. N. Alyea und F. Haber, *Die Naturwissenschaften*, p. 441, 1930.

Boscovich and Theories of Light.

IN histories of science full justice is done to the perspicacity of Newton in suggesting a compromise between the corpuscular and undulatory theories of light. According to Mr. Dampier-Whetham, "the most striking feature about Newton's theory is its resemblance to quite modern conceptions". Speaking elsewhere of recent views about light, he refers to one which postulates "a complex of particles and waves which recalls even more vividly Newton's ideas".

No mention, however, is made of the efforts of Boscovich to give a working hypothesis which would combine the good points of both conceptions. In Mr. Dampier-Whetham's book "A History of Science" Boscovich is mentioned only in connexion with his theory of matter and then the name is spelled Boscovitch. In his "Philosophiæ Naturalis Theoria" (my copy is dated Vienna, 1759, therefore one year after the first edition) Boscovich certainly sums up in favour of a corpuscular theory and "contra omnes alias hypotheses, ut contra undas, per quas olim phænomena lucis explicare conatus est Hugenius". But he is aware of the strong points of the wave theory and suggests that the light particle has an oscillatory movement. Doubtless the idea is crude and is founded chiefly on the assumption of unequal initial velocities of the components of each particle when expelled from the light source; but it was considered sufficiently important to be noticed by Thomas Young.

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University of Melbourne,
June 26.

THE extract from the writings of Boscovich which Prof. Osborne quotes is interesting. Until the reason for the rectilinear propagation of light-waves was explained by the work of Young and Fresnel on interference, the difficulties of an undulatory theory were very great, and it is not surprising that Boscovich, like Newton, "sums up in favour of a corpuscular theory". His attempt to combine with it some of the advantages of a wave theory as described by Prof. Osborne seems to me less successful than the method adopted by Newton.

C. DAMPIER-WHETHAM.

Curling.

IN NATURE of Mar. 15 there appeared a letter by W. H. Macaulay and Brig.-General G. E. Smith in which a theoretical treatment of curling was given. The results or conclusions were so nonconcordant with the known behaviour of curling stones that the authors ended their letter by raising a question as to what important feature of the motion had been overlooked.

As it is obvious that the writers were unaware of the experimental study of this problem made by myself, may I direct attention to the report on this work which was published in the *Transactions of the Royal Society of Canada*, Vol. 18, p. 247; 1924. The experimental work involved not only observing the motion of curling stones on standard ice sheets such as are regularly employed in curling, but also a study of torques transmitted to curling stones by a motor-driven rotating ice sheet. The results definitely pointed to the conclusion that the explanation of the curvature of the path taken by a stone possessing both translational and rotational velocities was to be found neither in the suggestion of Sir Gilbert Walker that the friction was greater on the rear edge of the cup nor in any differential air pressure effects as others have suggested, but rather hinges on the very rapid increase in the ice-stone friction as the velocity of the stone with respect to the ice becomes low and approaches zero. This means that the edge of the cup on which the tangential velocity due to the rotation is in a direction opposite to the direction of the translational velocity of the stone, that is, the slow edge of the cup, will experience a greater friction than the diametrically opposite portion of the rim. The