A Difference in the Photoelectric Effect caused by Incident and Divergent Light.

IN a letter dated April 26 which appeared in NATURE of May 12, Mr. Stuhlmann, of Princeton University, U.S.A., describes some experiments which he has carried out on the photoelectric effect of incident and emergent light. I should like to mention that I have been carrying out some experiments on the same subject at the Cavendish Laboratory, Cambridge, and obtained the same effect as that described quite recently by Mr. Stuhlmann. The experiments were completed more than two months ago, and the results obtained described in a paper communicated by Sir J. J. Thomson to the Royal Society on March 25. In view of the appearance of the above letter they may be briefly described here.

A thin quartz plate was covered with a very thin film of platinum in a discharge tube by directing the discharge from a platinum kathode on to it. The kathode radiation per unit time from the film under the influence of ultra-violet light was measured (1) when a constant beam of ultra-violet light was incident at right angles to the film; (2) when the beam emerged from the film, passing in this case first through the quartz plate. The intensities of the kathode radiations were found to be as 1 to 1·16, while the intensities of the incident and emergent beams were as 1 to 0·5. The conclusion that can be drawn from the experiments is that an electron liberated by ultra-violet light has a component of motion in the direction of propagation of the exciting light.

Cambridge, May 14. R. D. KLEEMAN.

Steam Tables.

IN NATURE of April 21 a review appeared of Profs. Marks and Davis's excellent new tables of steam properties, in which it is stated, without qualification, that the new calculations of the total heat of saturated steam are based upon a second-degree equation $H=a+bt+ct^2$. Both in the explanatory notes to the tables, and still more emphatically and repeatedly in a paper printed in the Proc. Am. Acad. Arts and Sciences, March, 1910, the authors state that this equation does not apply outside the limits 200°–400° F. Simple numerical tests also prove that the tabular figures do not agree with this formula outside these limits, and the formula would give H its maximum value at 72½° F. higher temperature, and four heat units more in quantity, than the tables make it. Mr. Davis says that no formula yet discovered will apply throughout the full range, and above about 450° F. the figures given are not credited with a high degree of accuracy or certainty.

Basing upon these new tables, I constructed a formula for total heat, which was published on December 24, 1909, in the *Engineer*, and gives the tabular results with practical exactitude from 70° to 500° F., that is, from 0·36 to 684 lb. per sq. inch absolute pressure. This formula is

$$H=1826+t-10^7\div 8(1620-t).$$

The following are its "errors" as compared with Marks and Davis's tables:—

$t°$ F.	30	50	60	70	80	100	150	200
H Diff.	−2·7	−1·6	−1·2	−0·7	−0·5	0	+0·4	−0·1

$t°$ F.	250	300	350	400	450	500	600
H Diff.	−0·2	−0·1	+0·3	+0·1	−0·4	+0·9	+24·9

The order of accuracy aimed at in this formula is further illustrated by the factors 0·9938, 0·997, 1·0066, and 1·055 having been tried for the term in t instead of 1, and having failed; while, in place of $10^7\div 8=1{,}250{,}000$, one of the factors which was tried and failed was 1,251,150.

The maximum value of H given by this formula is 1210, which is identical with that of the tables, but it occurs at 502° instead of 480°. Exactitude in placing this temperature of maximum H by the purely graphic analysis of a very few experimental results in its neighbourhood which was used by Marks and Davis, is evidently impossible. The tables do not venture to give any values of H above 600° F. My formula may very likely give considerable errors near the "critical point," which is somewhere near 690° F. Here other physical influences probably become prominent, as also, very probably, at low temperatures near that of maximum water density. ROBERT H. SMITH.

3 Thirlmere Road, Streatham, S.W., May 2.

I NOTICED at the time of its publication in the *Engineer* Prof. Smith's communication of the discovery of an empirical formula which would represent the values of the total heat even more accurately than that of Messrs. Marks and Davis. When speaking of their own formula the authors remarked (pp. 100–1):—"It has been used for the range above 212 in these tables"; but they evidently meant to limit the range to 400° F., although this is not clearly expressed in the paragraph from which the above extract is taken.

I agree with Prof. Smith that it is too much to expect any empirical formula to predict what will occur at the "critical point." THE REVIEWER.

Fireball in Sunshine.

ON May 10, at 7h. 52m. a.m., a magnificent meteor was seen by many observers in the Midlands. I have read a considerable number of descriptions of the object, but they are not very definite. The meteor was witnessed by persons not well versed in astronomy and exact positions for the apparent flight. It was a brilliant object with a bluish nucleus and tail of red sparks; the observed velocity was moderate. Though the sun was shining the meteor shone with conspicuous effect, and more than one person supposed it to be Halley's comet, or, at any rate, a fragment of that body.

Seen from Birmingham, the meteor's path was from the north-east to north-west, and one good observation ascribes to it an altitude of 30 degrees in a perfectly horizontal course. It is difficult to assign the real path, but an approximate computation places the height at from about 83 to 32 miles along a luminous trajectory of nearly 100 miles at a velocity of 20 miles per second. The position of the radiant point is doubtful, but several of the observations indicate it in Auriga or Perseus. The meteor travelled over the region of Yorkshire or Lincolnshire towards the district of Liverpool, but in the absence of more exact materials it is quite impossible to derive the path with certainty.

No stars being visible in the bright blue of the May morning which presented this unusual celestial phenomenon, the observers could not locate the position with the required accuracy; but it is hoped that further observations will come in from the northern counties of England. The "daylight fireball" of May 10 last reminds us of a similarly brilliant object which flashed out amid the sunshine on October 6 last at 9.40 a.m. W. F. DENNING.

Observations of Halley's Comet and Venus.

IT may interest readers of NATURE to know that the planet Venus was visible—plainly visible—in Natal all day to-day up to the time of its setting. The air was wonderfully clear and free from dust or moisture. At four o'clock in the morning Venus was unusually brilliant, the light therefrom shining into my bedroom. Halley's comet rose above the horizon at about 4.30, and, although distinctly visible to the naked eye, was pale and insignificant compared to the planet. By six o'clock the comet was no longer visible, having paled away before the sun had actually risen. At mid-day excited groups of natives and Europeans were gazing with wonder at what was mistakenly considered to be Halley's comet visible in broad daylight! Venus was then in the zenith, her glory defying the power of the mid-day sun. E. T. MULLENS.

Pietermaritzburg, Natal, April 22.

Earwigs of India.

IN NATURE of April 14 was published a review of my half-volume on the Dermaptera in the "Fauna of British India" series, in which the reviewer directed attention to a most regrettable oversight on my part in omitting to allude to the British Museum when acknowledging the various sources which supplied me with material.

Fortunately, the frequent references in the text betray my indebtedness, but I should be glad to take advantage of the hospitality of your pages to make amends, at the same time thanking your reviewer for pointing out this extraordinary omission, by expressing now my appreciation of the invariable and well-known courtesy of my good friends among the officials of the museum.

Eastry, Kent, May 5. MALCOLM BURR.