

steam formed, all the hydrocarbon being burnt to carbonic oxide and hydrogen, leaving the original hydrogen intact.

(2) That in all the complex ethylene-hydrogen-oxygen or methane-hydrogen-oxygen (or -air) mixtures examined by us, which were formed by blending a hydrocarbon-oxygen (or -air) mixture (A) with a hydrogen-oxygen (or -air) mixture (B), both having the same flame speed and both containing oxygen in defect (i.e. the respective pairs of primary mixtures numbered 3 to 7 inclusive in the foregoing list) the effect of progressively increasing the proportion of (B) in the various blendings in each given series of tests was to lower the observed flame speed progressively until a point was reached when the resulting complex mixture no longer propagated flame at all.

The fact that the flame speeds for  $(\text{CH}_4 + \text{H}_2)$ -air mixtures exhibit only small deviations from the supposed 'law' is scarcely relevant to the discussion because of the comparatively small proportion of a hydrogen-air mixture which has to be blended with a methane-air mixture of the same type and speed to produce a  $(\text{CH}_4 + \text{H}_2)$ -air mixture containing oxygen in defect, the only condition that really matters. Thus, for example, in the case examined by us, only 13.35 volumes of a 71.9  $\text{H}_2/28.1$ -air mixture (flame speed = 64.1) would have had to be blended with 86.65 volumes of an 11.05  $\text{CH}_4/88.95$ -air mixture (flame speed = 64.5 cm. per sec.) to produce a  $(\text{CH}_4 + \text{H}_2)$ -air mixture with a flame speed of 58 cm. per sec., that is, with a deviation of only 10 per cent. from that required by the 'law' (see Table V. on p. 439 of our paper). When, however, oxygen was substituted for air as the supporter of combustion, a much greater deviation was observed; for, as will be seen from Table IV., p. 437 of our paper, if a 53.2  $\text{CH}_4/46.5 \text{O}_2$  mixture were to be blended with a 92.9  $\text{H}_2/7.0 \text{O}_2$  mixture so as to form a  $(\text{CH}_4 + \text{H}_2)$ -oxygen mixture, the speed of the two primary mixtures (each 114 cm. per sec.) would be lowered in the process to about 88 cm. per sec., or by about 23 per cent. Our experiments also indicated that a series of  $(\text{CH}_4 + 2\text{H}_2)$ -oxygen (or -air) mixtures (oxygen being in defect) would show even more considerable deviations from the 'law.'

In conclusion, I would add that our experimental examination of the supposed 'law' was undertaken from a sense of duty, and that, having satisfied ourselves that it does not apply to gaseous explosions generally, it has no further interest for us. So, with more important matters to investigate, we do not propose continuing its discussion any further.

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### The Walrus.

ALTHOUGH the walrus is usually found near the land subsisting on the shell-fish it finds at the bottom, it is also on rare occasions found amongst the drift ice in deep water, far from land, subsisting on seals and other mammals.

A few examples of the latter kind are recorded in the log-books of whaling and sealing voyages to the Greenland Sea in my possession, and several others came under my own observation during voyages to the same locality.

On one occasion (July 1890), when amongst the ice, off the east coast of Greenland, I noticed an unusual number of birds, some oily water, and something floating in it. Lowering a boat, I found it to be a

dead narwhal. It was criss-crossed with deep wounds, had its abdomen ripped open and partly eaten away, and its viscera, including most of the liver, removed. It was only recently dead. Hidden from me and my companions in the boat by a high piece of ice, but visible from the mast-head of the ship a mile or two away, a large walrus lay asleep on an adjoining piece of ice. Unaware of this, and considering the narwhal—a female without a tusk—valueless, I returned on board empty-handed, to learn about the walrus and to be told by my father that the ship could no longer be delayed.

On an earlier voyage, before I commenced sailing with him, my father, the late Capt. Gray of Peterhead, came across a narwhal recently dead and a walrus engaged either in killing it or eating it. The facts will be found fully reported in *Land and Water*, December 1879. Briefly, in July 1879, in lat. 78°, long. 3° W., amongst the ice between Greenland and Spitsbergen, my father noticed an unusual commotion in the water, and, on ascertaining the cause, lowered a boat and secured both the walrus and its victim. The body of the latter was scored with deep wounds, and the stomach of the former was packed with its blubber.

On another occasion (June 1887), in lat. 73°, long. 16° W., we saw a walrus in the water with a seal in its mouth. Lowering a boat, we killed the walrus and retrieved the dead seal. The latter, a floe-rat, *Phoca hispida*, was almost cleft in twain by a single wound. On other occasions I have removed portions of seal (bits of skin, blubber and liver) from a walrus's stomach. (Particulars are to be found in the *Zoologist*, 1889, p. 8.)

The solitary animals that we used occasionally to find amongst the ice far from land subsisting in the way described were all of large size, and may well have belonged exclusively to the male sex. In the only two instances in which it is recorded the sex is male; none of them were accompanied by calves; moreover, in the summer months the adult males cling less to the land than the females and immature animals, venture farther afield, and are more likely to be seen far from land. In fact, the old 'bulls' are not to be found in the in-shore waters of Spitsbergen and Franz Joseph Land in June and July (see Allen, "North American Pinnipedia," p. 108, and *Zoologist*, 1895, p. 75).

In Scoresby's time straggling walrus were apparently more frequently seen by the whalers on the so-called 'whaling banks' between Greenland and Spitsbergen. In his "Arctic Regions," vol. 1, p. 508, we read of a single ship, while engaged in its quest for whales, picking up as many as half-a-dozen in a single season without approaching either Spitsbergen or Greenland with the express purpose of catching it. This may well have been the case, for it was not until a later date that the Norwegian walrus hunters began to kill them in the in-shore Spitsbergen waters and that it became seriously depleted in number.

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### Surface Film of Aluminium.

IN NATURE of May 7, p. 673, I have read with a good deal of interest an account of some experiments made on aluminium foil which had been treated by the Bengough anodic process. In some experiments made on ordinary aluminium foil in connexion with a research on the determination of oxide in aluminium, details of which work was published in the *Jour. Soc. Chem. Ind.*, vol. 45, p. 170, the writer, in collaboration