turn to dust, leave no record of an age-long persistence under their verdant sanctuary. Their life-story, however, affords a highly instructive picture of how generations knowing only wood, of whom no evidence survives, may have succeeded in handing on their race from one millennium to another.

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The Hydrogen Doublet.

IN measuring doublet separations, the Fabry-Perot interferometer can be so adjusted that the fringes of one component fall half-way between those of the other. This eliminates most of the distortion present in other instruments. Using this method, the doublet separations at a pressure of 0·5 mm. and a current density of 0·25 amp. per sq. cm. have been found to be $0{\cdot}316 \pm 0{\cdot}002$ for $H\alpha$, $0{\cdot}329 \pm 0{\cdot}005$ for $H\beta$, and $0{\cdot}353 \pm 0{\cdot}007$ for $H\gamma$. The wave-lengths of each component have also been determined and indicate that $R = 109677{\cdot}70 \pm 0{\cdot}04$, with the use of Sommerfeld's formula.

The doublet separations, however, do not fit Sommerfeld's simple theory with the ordinary principle of choice. They can be explained by assuming that the forbidden components for which $\Delta k = 0$ are present, increase in intensity with an increase in current, and are polarised with the electric vector parallel to the current. These components have always been found in the work on He^+, so that they would naturally be expected in hydrogen. The presence in $H\alpha$ of the component designated by Sommerfeld as II*c*, will reduce the theoretical separation to the observed value, while the presence of I*b* will not affect it very much. The polarisation of II*c* will produce a smaller doublet separation in the light from the side of the tube than in that from the end. This is found to be the case when the current is heavy enough partly to orient the atoms. The corresponding polarisation of the light from the side is found also at current densities in the neighbourhood of 1·5 amp. per sq. cm. The increase in intensity of these components with an increase in current will produce a greater relative increase in the short wave-length component than in the other. This is found experimentally to be the case.

The intensities predicted by Kramers, upon the assumption of a disturbing field, are much too small to explain the observations if fields small enough to be compatible with the observed width of the lines are used. The results tend to support the suggestions of Uhlenbeck and Goudsmit (NATURE, February 20, p. 264), which in effect replace the principle of choice for azimuthal quantum numbers with the one for inner quantum numbers.

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Pasadena, California, March 13.

Domestic Heating.

LETTERS to NATURE have to be short, so every word should carry its full significance. I said in my letter in the issue of March 6 that the peculiar value in glowing coal fires "is either absent or very weak in radiation from anthracite stoves or gas and electric fires." To a careful reader it would be obvious that I had tried the effects of radiation from a gas fire. Prof. Hill (April 3, p. 487) is incorrect in his assumption that I would have got "equally good effects from a *glowing* gas fire." I did *not* get equally good effects from a glowing gas fire. On the contrary, I got markedly inferior effects. Even the best form of gas fire is positively irritating rather than healing to surfaces exposed to it.

Of course, I allow that the bright light of a good electric lamp has some slight beneficial effect, and is better than nothing. Prof. Hill quotes its effect on the iguana. Human physiology, however, is very different from that of an iguana, and however useful evidence may be from animals, first-hand evidence from a sensitive human subject is much more valuable.

Prof. Hill speaks of the coal fire polluting the atmosphere and screening off the sunshine. May I ask him to examine the returns of the tonnage used in domestic fires and note how small it is compared with the millions of tons used by commercial fires? I am entirely with him in claiming that electricity and gas should be used in all factories and for cooking and heating water. Moreover, before condemning the domestic coal fire, Prof. Hill should take into consideration the possibility of its improvement (which I urged upon our Government in 1914). The valuable domestic qualities of coal could be retained and the smokiness and economic loss of by-products be eliminated by the use of partial coking at low temperature.

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The Oxidation of Ammonia.

L. ANDRUSSOW (*Ber.* 59, 458, 1926) has suggested a scheme of reaction for the oxidation of ammonia in which nitroxyl, NOH, is an intermediate product. The scheme put forward by Andrussow, together with many others, were derived by the present writer some years ago when engaged in experimental work on ammonia oxidation, but none of these has been published. It seems desirable, however, to point out that the scheme put forward by Andrussow suffers from the defect that nitroxyl, NOH, if formed as an intermediate product, might be expected to break down to a considerable extent into nitrous oxide, a substance which, so far as the writer is aware, has never been detected among the products of the oxidation of ammonia. A more likely intermediate product would be nitrohydroxylamic acid, which is known to break down with formation of nitric oxide. It is suggested that the oxidation may occur in the following stages, each reaction in which is bimolecular or unimolecular:

(i) $NH_3 + O_2 = NH_3O_2$.
(ii) $2NH_3O_2 = 2NH_2(OH)_2$.
(iii) $2NH_2(OH)_2 = N_2H_2(OH)_2 + 2H_2O$.
(iv) $N_2H_2(OH)_2 + O_2 = N_2H_2O_3 + H_2O$.
(v) $N_2H_2O_3 = 2NO + H_2O$.

The writer had intended to make further experiments on the mechanism of the oxidation of ammonia but has not been able to carry these out. He therefore puts forward the above hypothesis as an alternative to that of Andrussow, since it does not seem open to the objection mentioned above.

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What We Know.

LET this, from Meredith, be my reply to the electrician in my composite friend Sir Oliver Lodge (NATURE, March 27, p. 453).

O sir, the truth, the truth! is't in the skies
Or in the grass or in this heart of ours?
But O the truth, the truth! the many eyes
That look on it! the diverse things they see,
According to their thirst for fruit or flowers!
Pass on: it is the truth seek we.

HENRY E. ARMSTRONG.