On the Polarised Emission of Mercury Lines.

EXPERIMENTS are in progress in which the mercury spectrum is excited by a directed stream of electrons from an oxide coated filament, and the polarisation of the lines examined. The track of the electron beam in a field-free space at a pressure of $1/10000$ mm. is well defined, and little visible light is emitted from points not in the path of the electrons. Accelerating voltages of 30-40 volts have mainly been used, and the light from the stream is observed at right angles to its direction. Under these conditions a number of p - d combinations are polarised, the plane of polarisation being with the maximum electric vector parallel to the stream. The plane of polarisation rotates with the tube and so cannot be governed by any stray field.

The following are the lines so far tried, the brackets indicating lack of separation:

Polarised.	Unpolarised.
λ 5791 A.U. $\left\{ \begin{array}{l} 2P-3D \\ 2P-3d_3 \end{array} \right\}$	λ 5461 Å.U. $2p_1-2s$
5770 $\left\{ \begin{array}{l} 2P-3d_2 \\ 2P-4D \end{array} \right\}$	4916 $2P-3S?$
4347 $\left\{ \begin{array}{l} 2P-4d_3 \\ 2P-4d_2 \end{array} \right\}$	4358 $2p_2-2s$
44 $\left\{ \begin{array}{l} 2P-5D \\ 2P-5d_3 \end{array} \right\}$	4108 $2P-4S$
39 $\left\{ \begin{array}{l} 2P-5d_2 \\ 2P-5d_1 \end{array} \right\}$	4078 $2p_2-2S$
3906 $\left\{ \begin{array}{l} 2P-5d_3 \\ 2P-5d_2 \end{array} \right\}$	4047 $2p_2-2s$
04 $\left\{ \begin{array}{l} 2P-5d_3 \\ 2P-5d_2 \end{array} \right\}$	3650 $2p_1-3d_1$
02 $\left\{ \begin{array}{l} 2p_1-3D \\ 2p_1-3d_3 \end{array} \right\}$	
3663 $\left\{ \begin{array}{l} 2p_1-3D \\ 2p_1-3d_3 \end{array} \right\}$	
3655 $\left\{ \begin{array}{l} 2p_1-3d_2 \\ 2p_1-3d_1 \end{array} \right\}$	

It is seen that the effects on combinations involving the various d and D levels are not completely disentangled, but that the results seem consistent with the view that the polarisation occurs in the case of combinations of the p or P levels with the D , d_2 , and d_3 levels.

In the case of the yellow mercury lines 5770 and 5791, the effects can be investigated visually, using a filter. It has been found that the degree of polarisation decreases as the speed of the electrons is increased. At 20 volts the polarisation is about 20 per cent., but falls to less than 3 per cent. for an exciting voltage of 70 volts. Further, the polarisation of the light emitted directly from the path of the electrons can be distinguished from the smaller degree of polarisation of the light emitted from points outside the path of the stream. This seems to lead definitely to the conclusion that the polarisation is caused by the directed character of the electron stream.

The polarisation of the yellow lines is reduced to zero by a magnetic field of about 20 gauss at right angles to the stream and in the direction of observation, but a similar field parallel to the stream has no effect. The same field perpendicular to the stream and to the direction of observation reduces the amount of polarisation to roughly half its value. It remains to be seen whether balancing out the earth's field will bring to light any further effects.

The polarisation of the D lines of sodium excited by a directed stream of electrons has independently been investigated by Kossel and Gerthsen (*Ann. der Phys.*, 77, 273, 1925), but no effect was found; and just as this note was prepared, a paper of Ellett, Foote, and Mohler (*Phys. Rev.*, 27, 35, 1926) came to hand. Using a very low vapour pressure and exciting voltages only a little greater than the corresponding excitation potentials, they studied the cases of the sodium D lines, again with a negative result, and of the mercury line 2537, in which case they found a polarisation of 30 per cent. with the maximum electric vector perpendicular to the direction of the stream, that is, in a plane at right angles to that in

which polarisation has been found in the case of the p - d combinations. As these authors point out, theoretically we should expect a polarisation with the maximum electric vector parallel to the stream, as is observed in the cases referred to in the present note. The decrease of the magnitude of the polarisation with increasing speed of the exciting electrons and the influence of the application of a magnetic field are also effects which may be interpreted theoretically.

H. W. B. SKINNER.

Cavendish Laboratory,
Cambridge, February 8.

The Leaping Salmon.

WHEN Dr. Starr Jordan says "All salmon will leap over a waterfall where it is possible" (*NATURE*, January 16, p. 85) he surely refers to salmon in countries like America and Norway, where spring fish do not occur. In Britain salmon enter fresh water, in very many rivers, in every month of the year, and those which do so in the cold-water months—February, March, January, and April, to mention them in the order of coldness—do not leap at falls.

On arrival at the foot of a fall where there is much white water, even when the fall is only a few feet high, all farther ascent is stopped until the wintry thermal conditions have passed. In Scotland, this is usually about the third week in May.

Another point to which, perhaps, I might venture to direct attention is the title of the illustration of the leaping salmon. This gives the impression that the particular fish shown is leaping a fall 30 feet high. This must mean that the falls of this Oregon river are really a series of cascades, since no salmon can leap anything like 30 feet. Provided there is a deep pool below the fall, from the bottom of which a fish can make a rapid upward swim, a salmon can leap about 8 to 9 feet vertical height. I have seen a sea-trout of apparently only about $2\frac{1}{2}$ lb. do the same.

W. L. CALDERWOOD.

Edinburgh, March 1.

Re-Paging of Reprints.

I THINK every one will agree that one of the worst crimes of an author is to give wrong references. Will you kindly allow me to point out that a very frequent source of such errors arises from the re-paging of authors' separate copies? In my editorial work for the *Geological Magazine* I find many instances, and have learnt by experience always to mistrust and verify a reference giving page 1. It is easy to understand that foreign and colonial writers are specially likely to fall into this trap, as often they must rely on authors' reprints and have not a complete series of the periodical at hand.

The practice mentioned is very hard on both authors and editors, besides adding unnecessarily to the cost of reprints.

R. H. RASTALL.

Christ's College, Cambridge.

On One-Eyed Vision.

IN continuation of Sir Arthur Schuster's letter, February 28, p. 228, I feel sure that a person looking with one eye, when time enough is allowed for attention, substitutes for the doubleness of appearance utilised by two eyes a slight unconscious waggle of the head, and thereby secures the needed parallax.

Also I recall that once, glancing over back premises in London with one eye, I caught a glimpse of a cat walking on a near wall which looked surprisingly like a tiger on a far wall.

OLIVER LODGE.

Italy, February 19.