It has occurred to the writer that whenever a very weak radiation, corresponding in wave-length closely with that of a Br*K* line—perhaps an α_2 incident radiation—falls on a film or plate, the bromine in the emulsion, or the emulsion in conjunction with the bromine, is stimulated into greater photographic sensitivity and a comparatively strong line appears, especially under the conditions of our experiments, *e.g.* long exposure.

This hypothesis would seem to give a satisfactory explanation of the appearance of the '1·040 line.'

As an incidental feature, on the plate we had a slight fogging along one side or edge which partly obliterated the *0·930* line, showing that slight darkening may obscure a weak line, as was stated by the writer in connexion with the suspected $87L\beta_1$ line (see citations above). The stronger lines were not, however, reduced in intensity by the slight side-fogging.

In conclusion, it will be seen that if the above view is in the main true, then the following radiations, in terms of lines, though very weak, would give rise to more or less strong lines: $HgL\beta_2$ 1·0375, $AsK\beta_2$ 1·038, ($87L\alpha_2$ 1·039), ($BrK\alpha_1$ 1·0377), $TlL\beta_4$ 1·0371; $RbK\alpha_2$ 0·9277, ($BrK\beta_1$ 0·931), Cd second order $K\beta_2$ 0·928. The brackets indicate complete exclusion from consideration or doubt in respect of stimulation. Some of these radiations can be eliminated by control experiments, so that it may be possible to find out the element which is operative if the effect is not due to a complex of lines. The optical spectrum would be helpful here as a guide, but in our case it has not revealed an element corresponding with either of the two lines in question, as might be expected.

It seems important that the whole bromine X-ray spectrum (*K*) should be determined if there is anything in the idea here advanced.

Perhaps one of your readers would kindly offer a better explanation of the matter than here attempted, bearing in mind that there is a tendency for all the lines in question to be shifted perceptibly towards the longer wave-length side, and on this account our line 1·032 (*loc. cit.*) may be the same as the *1·038* line.

F. H. LORING.

Relative Intensities of the D_1 D_2 Lines of Sodium in Comets and in Low Pressure Laboratory Sources.

SODIUM D lines of emission were identified beyond any possible doubt in the heads of the following comets: Wells, (1882*a*); Great Comet, 1882 (1882*b*); 1910*a*; Halley's Comet (1910*c*); and Brooks' Comet, (1911*c*). The appearance of these lines has always been of temporary character at perihelion. The spectra of the first three comets were observed either visually or by means of a prismatic camera, so that the only reliable determinations of wave-lengths are furnished for the comets Halley and Brooks. The spectrum of the former was taken by E. C. Slipher (*Lowell Observatory Bull.* 52) with the slit spectrograph of Lowell Observatory, and that of the latter by W. H. Wright (*Lick Observatory Bull.* 209) with the Lick refractor.

Slipher gives for the sodium lines only one wave-length, 5891·9, which is sufficiently near $D_2 = 5890{\cdot}2$. It seems as if the other component, D_1, was entirely absent, although there remains an element of doubt as to the sufficiency of the dispersion employed. If 5891·9 is merely a blend of D_2 and D_1, their relative intensities should be about 3·5 to 1.

In the spectrum of Brooks' comet, Wright found both components, D_2 with wave-length 5889·4, and D_1 with wave-length 5895·5. He says: "Both of the D lines are present, forming a close double, D_2 being much the brighter." The relative intensities were estimated as 3 to 1.

Thus there would seem to be good astronomical evidence to the effect that sodium D lines are present in the spectra of certain comets and that they show very unequal intensity, D_1 being much weaker than D_2. If we take into account that D_1 may blend with the band 5897·5 of high-pressure carbon monoxide, as suggested by Fowler (*Monthly Notices, R.A.S.*, **70**, 490, 1910), the contrast between D_1 and D_2 will be still greater. Laboratory conditions for the excitation of these high-pressure bands, however, would scarcely lead us to expect to find this spectrum in comets.

R. W. Wood has shown (*Phil. Mag* (6) **27**, 1018, 1914) that it is possible to excite D_2 by fluorescent methods with an intensity excessively greater than D_1.

One of us has recently observed the excitation of the D lines with relative intensities strongly suggestive of their appearance in comets, and under conditions of excitation which also are somewhat similar. The tube used was provided with a hot cathode about five millimetres in length, richly coated with oxides containing very minute traces of sodium as impurity. The anode was a nickel cylindrical Faraday cage entirely enclosed (except for an observation slot) in which the end opposite to and about one millimetre from the hot cathode consisted of iron gauze. This grid-plate combination was maintained about 200 volts positive with respect to the filament.

Using as high a filament temperature as could be safely maintained, and a residual gas pressure of carbon monoxide of about 10^{-5} cm. or less, the radiation inside the cage exhibits chiefly the comet-tail bands with traces of the Ångström bands of carbon monoxide. Close to the hot filament, however, the D lines can be observed with an estimated intensity ratio $D_2 : D_1 = 5$ when the sodium spectrum is brighter than the comet tail spectrum. As the partial pressure of the sodium decreases, however, this ratio becomes much larger and of the order of 25 to 1. Indeed, when the sodium spectrum is fainter than the comet-tail spectrum, D_2 is the only line which can be observed visually. Conditions here obviously suggest those of a comet near perihelion, and it is hoped that further experimental work may shed more light on this interesting phenomenon.

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March 17.

Applied Entomology.

I WRITE to invite attention to the state of applied entomology, which seems to be capable of improvement in Great Britain and in other countries. We entomologists, whose profession it is to control or destroy the insects which carry diseases of men and domestic animals, or destroy our crops, can indeed claim that we have met with a certain measure of success; but some of us feel that the success is much less than might be expected, in view of the great amount of work which is done.

Entomology may be divided into two parts—the study of form and the study of function. It is the former (anatomy, both of adults and of early stages, systematics, etc.) which leads to correct identification, and enables us to preserve an orderly arrangement in our study of the half-million species of insects which are already known. This is clearly of great importance, and on the whole one may say that it is well done. But the study of function—physiology in a wide sense of the word—is of even greater importance, because it is on a knowledge of all the vital activities of the insects that we base our control of