necessarily be confined to the region of rupture, the evidence seems to be in favour of the luminescence being the result of the sudden extension of the viscous substance.

In view of the uncertainty that exists regarding the source of bioluminescence and the scantiness of the evidence in support of even the oxidation theory, a source of light that so closely resembles that emitted, for example by the glow-worm, must be of interest to zoologists and be worthy of further consideration.

It is suggestive that the contents of the luminous cells are so often described as oily, glutinous, and viscid. Is it not possible, therefore, that these gelatinous cells or their granular contents may be capable of sudden longitudinal extension with the production of light of a bioluminous character?

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May 11.

Dosage with Ultra-Violet Radiation.

THE beneficial results obtained in the treatment of many diseases by the application of ultra-violet radiations raise the question as to which radiation and what amount is specific to a certain effect. This question is rendered the more difficult of answer by the variety of sources used and the lack of specification of the exact conditions of operation.

The variables affecting the health and vitality of a living subject undergoing treatment are sufficiently numerous in themselves to warrant that the ultra-violet radiation used shall be fixed in its character. Records of treatment and effect (which must now daily be compiled) would be rendered the more valuable if the radiations used could be specified. The more accurate the specification is made, both as to spectral character of the radiation as a whole and as to the energy distribution among the various wave-lengths used, the more rapidly will progress result. At best, measurements of ultra-violet energy are difficult, and it is not hoped or suggested that each person responsible for the administration of ultra-violet radiation would make such energy measurements. Help, however, must be afforded to the general user by those exclusively engaged in the study of ultra-violet radiation by intensive attempts at complete and accurate standardisation of the radiations used and in the development of steady fool-proof sources. Both are problems difficult of accomplishment but not impossible, and must ultimately be solved.

Of the devices used as sources of ultra-violet radiation, constancy in the spectral distribution of energy is not approached by any open arc device. Closer realisation of such constancy is given by the use of quartz-enclosed arcs. Referring particularly to mercury vapour lamps, with due specification of the power input and the conditions of use (ventilation, etc.), approximately constant radiation characteristics are realised. The fulfilment of the requirements of constancy and reproducibility of radiation, to be obtained by the use of an enclosed arc, goes hand in hand with the advantages of the manipulation of a fixed closed unit requiring little or no adjustment.

Apart from the sun and open arcs, there exist but three noteworthy sources of ultra-violet radiation available for therapeutic purposes—the mercury arc, the tungsten arc, and the super-heated tungsten filament—each being enclosed in a fused quartz container. The spectral characters of the radiation obtained from these three sources, however, differ greatly. The continuous spectrum of the tungsten filament may be made to reach 290 $\mu\mu$, but the energy in this region is small. The spectrum of the tungsten arc is closely packed with lines, none of which carry a preponderating share of energy. This spectrum tails rapidly in intensity towards 200 $\mu\mu$. The mercury arc spectrum, on the other hand, which extends well into the deep ultra-violet, has the energy of its ultra-violet radiation concentrated about relatively few wave-lengths.

Despite these great differences in the spectral character of the radiations, no great and fundamental distinction appears so far to have been made between the result obtained in the treatment of disease and in the irradiation of vitamin-deficient food-stuffs by radiation from these various sources.

Is it, therefore, to be concluded that radiation belonging to one (or several) of the intense lines in the mercury arc spectrum is responsible for the beneficial therapeutic results obtained? The question presses for answer. The production of vitamin properties in food-stuffs appears to be a subject peculiarly amenable to exact study; and an examination of the results to be obtained by the ultra-violet irradiation of vitamin-deficient food-stuffs using the different sources in turn and with complete specification of the conditions of their use, would help towards our understanding of the mechanism of the changes which are induced.

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The *K* Absorption Levels of the Light Atoms: A Correction.

IN Roy. Soc. Proc., A, vol. 104, p. 455 (1923), I gave the results of measurements of a number of "soft" X-ray absorption levels. The ν/R values of the levels were deduced from the kinetic energies of the groups of electrons expelled from the atoms by X-rays of known frequency. In most cases the results agreed very well with the values deduced from spectroscopic X-ray data, but fairly wide systematic deviations were observed in the case of the *K* levels of the light atoms—my values being appreciably higher than those previously accepted. In the case of the oxygen *K* level the value of ν/R came out 42·3, which is 4 units—more than 50 volts—greater than Kurth's value of the *K* critical excitation potential for oxygen (Kurth, *Phys. Rev.*, 18, p. 461, 1921).

As was pointed out in the original paper, my method of measurement was not suitable for exact determinations of very "soft" levels: the results in these cases come out as the difference between two large and nearly equal quantities, one of which is deduced from the measurement of a magnetic field and a radius of curvature, while the other is taken from the X-ray spectroscopic tables. Any inaccuracies in the values of the universal constants e, e/m_0, and h would introduce systematic errors into the calculations, the effects of which would be most marked in the case of the levels of lowest energy. Apart from uncertainties of this kind, an error of 1 part in 1000 in the absolute value of the magnetic field would cause an error of nearly 3 per cent. in the value of ν/R deduced for oxygen *K*. I stated, however, at the time that the deviations of my results from the older results were too big to be accounted for by defects in the method or errors in the measurements (*loc. cit.* pp. 478-9). I now wish to correct this statement.

I have recently extended the series of measurements of corpuscular spectra, with new and improved apparatus (work now in course of publication in the