

The simultaneous great enhancement of two lines, one of which coincides with H_{α} , the other with H_{β} , can scarcely be accidental, and our spectrogram thus would show that *occasionally considerable quantities of hydrogen are present in the auroral region.*

The fact that the hydrogen concentration usually is too small to give detectable lines would show that *the occurrence of strong hydrogen lines must be due to showers of hydrogen or to a kind of 'hydrogen radiation' occasionally coming from the sun.* The hydrogen is then removed from the auroral region through the formation of water vapour and condensations, which may appear as luminous night clouds.

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¹ Vegard, L., *Phil. Mag.*, **46**, 195 (1923); *Z. Phys.*, **16**, 367 (1923).

² Vegard, L., *Geof. Publ.*, **9**, No. 11 (1932).

³ Vegard, L., *Geof. Publ.*, **10**, No. 4 (1933).

⁴ Vegard, L., and Harang, L., *Geof. Publ.*, **11**, No. 15 (1936).

Origin of the λ 4932 Emission in the Spectra of Novæ

MESSRS. J. DUFAY AND M. BLOCH¹ have recently discussed the presence of a faint emission band at about 4932 Å. in the spectra of Nova Herculis (1934) and of Nova Aquilæ (1918), and have suggested that the radiation is to be identified with the forbidden $^3P_0-^1D$ transition of O (III), the companion of the N_1 and N_2 lines at 5007 and 4959 Å. respectively. This assignment, as was mentioned by Dufay and Bloch, was made by Bowen and Wyse in the spectra of N.G.C. 6572 and 7027, and the line was later observed also in N.G.C. 7662².

While the identification is probably correct in the nebulae cited, it appears to be open to question in the novæ, particularly in Nova Aquilæ (1918). The maximum observed by me at 4932 Å. in the spectrum of this nova is very probably only a subsidiary maximum in the broad N_2 emission band, centred at 4959 Å.; such is the interpretation in my paper³, to which Dufay and Bloch make reference. The relatively strong continuous spectrum, as well as the great width of the bands themselves (approximately 50 Å.), tends to obliterate the faint radiations. Therefore if a *bona fide* emission band were present at 4932 Å., it would probably have to be at least 1/10 or 1/20 as bright as N_2 in order to be detected, and thus it could not be the $^3P_0-^1D$ emission, which is much fainter both by prediction and by observation in the nebulae.

The case for Nova Herculis (1934) is not so clear-cut. The Lick Observatory spectrograms of 1935 and 1936 confirm the observation of Dufay and Bloch of a faint emission at 4932 Å. The emission appears to be several times stronger with reference to N_1 and N_2 than in the nebulae, thus suggesting some other identification. The difference, however, may possibly be attributed to the differing contrasts of the two emulsions involved. Another approach to the question consists in examining the constancy or variability, in Nova Herculis, of the intensity ratio, I_{4932}/I_{4959} , which should be an atomic constant for O III. Two Lick Observatory spectrograms, dated September 26, 1935, and May 1, 1937, both record the N_2 emission as of about equal density, the image on the latter plate being slightly denser than on the former. The 4932 Å. line appears definitely on the former plate (density about 0.8),

while on the latter plate it is absent. Inasmuch as the two spectrograms have been made on the same type of emulsion and have been developed in the same way, and further, since both plates are capable of showing the lines resolved, the inference is that the 4932 Å. line faded in the interval, with respect to N_2 , by a factor of at least 10, and that it is therefore not chiefly attributable to O III.

Perhaps this observation should not be taken at its face value, in view of the possibility of solarization of the strong lines on one or both of the plates, or other spurious photographic effects. In any event, there appears to be room for doubt regarding the assignment of the nova emission at 4932 Å. to O III.

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¹ NATURE, **144**, 593 (1939).

² *Lick Obs. Bull.*, **19**, 1 (1939).

³ *Publ. Lick Obs.*, **14**, Part 3 (1939).

Electron Diffraction Examination of Oxide Films on Light Metals

WHILE iron rusts quite easily in air, such baser metals as aluminium, magnesium, zinc, etc., do not manifest this tendency and retain their metallic lustre for a considerable length of time. This commonplace fact is interesting but requires experimental study for a full understanding. For a study of metal surfaces as in these cases, the method of electron diffraction is most powerful.



MAGNESIUM AT ROOM TEMPERATURE.



MAGNESIUM AT 400° C.

□ INDICATES THE EXISTENCE OF MG. ○ AND △ INDICATE THE EXISTENCE OF MgO.

Electron diffraction photographs of magnesium specimens, prepared by polishing the surface with a coarse sandpaper, were taken after exposing them to air at room temperature, at 200° C., at 300° C., and at 400° C. Of the two photographs reproduced, one is that of the specimen at room temperature and the other is that of the specimen heated at 400° C. In the graphs, the horizontal distance from the origin is the radius of the ring while the length of the lines is a measure of the intensity by visual estimation.