level with higher J value. If now the intersection takes place at the outer or inner part of the predissociated curve, then, as a result of both circumstances just mentioned, the $U(r) + T(r, J)$ curves belonging to low J values probably will be more influenced than those which belong to higher J values (first case). On the other hand, if the intersecting point lies near r_e and the intersecting curve is then mainly symmetrical between the inner and outer part of the predissociated curve, all the rotational levels in $v = 0$ may be more influenced by the intersecting curves than those of $v = 1$ (second case, BaH, cf. Grundström, diss. Fig. 31).

Thus the position of the intersecting point in relation to the equilibrium distance r_e of the predissociated state seems to be significant for the predissociation phenomena.

A fuller account will appear in the *Zeitschrift für Physik*.

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Atomic Lines in the Auroral Spectrum

IN a letter in NATURE of June 25, R. Bernard has published results of auroral spectrograms obtained at the Tromsö Observatory. In that connexion, I should like to direct attention to the fact that all the experimental results he derives from his spectrograms are well known and have been described by me and my collaborators.

The presence in the auroral spectrum of bands of the ε-system, discovered and interpreted by me as due to the forbidden transition $A(^3\Sigma) - X(^1\Sigma)$ of N_2, was found in 1933[1]. About fifteen vibrational bands of the ε-system (now commonly called Vegard-Kaplan bands) including those mentioned by Bernard, were observed by me in the auroral spectrum[2].

It is also well known that spectra of diffuse auroras and auroras at great altitudes[3] in many ways differ from those of the distinct forms at low altitudes. They differ, for example, in the appearance of a large number of weak lines, many of which are not to be found on spectrograms from distinct forms at low altitudes (cf. ref. 1, Pl. 1, Fig. 2).

The line 3470 was obtained by me with a large quartz spectrograph and measured so long ago as 1922[4,5], and on a large number of spectrograms during the following years.

From our spectrograms of fairly large dispersion we get the mean wave-length 3469·4. In accordance with the observations of Bernard, we find that the intensity of the line 3470 relative to bands of the 2*P.G.* may differ considerably for different spectrograms (cf. ref. 5, Table XI and ref. 1, Table X). We have regarded the line as the head of a band 2*P.G.* (3–4) (3469), while Bernard has referred it to the line 3470 recently observed by Kaplan[6] in a nitrogen discharge tube, thought to be due to the forbidden transition from the metastable (^2P) state to the normal (^4S)-state of the neutral nitrogen atom.

Our interpretation is supported by the close agreement in wave-length and by the fact that a number of other bands of the series 2*P.G.* (3–*n*) appears in the auroral spectrum. The great variation in intensity relative to other bands of the 2*P.G.*, however, would be accounted for if we suppose that an atomic line (3470) with varying intensity also appears. Also on my spectrograms (cf. plates, refs. 1 and 2) the line appears sharp, but for small photographic densities the head of a band may also appear quite distinct.

Although the present observational data do not settle the question as to the appearance of the NI-line, the interpretation suggested by Bernard is of particular interest in relation to certain results obtained by me and my collaborators.

Already from the spectrograms obtained in 1922–24 we measured a number of weak lines which were referred to atoms of oxygen and nitrogen in the neutral or ionized state. Until recently, these lines had only been measured from spectrograms with small dispersion, so the identification was uncertain. During the last two years, with E. Tönsberg I obtained two of these lines (4415·1 and 4368·2) with a spectrograph of large dispersion, and was able to identify them as O-lines. Their intensity follows the sunspot frequency, which shows that the concentration of oxygen atoms fluctuates in a similar way to the solar activity.

Since these results were obtained, I have made a careful study in order to see which atomic lines might possibly appear in the auroral spectrum.

Up to the present, I have found that about twenty auroral lines may be referred to atoms of oxygen and nitrogen in the neutral or ionized state. Within the limit of error, ten of these lines coincide with nebular lines.

In addition to the well-known green and red OI lines, we find that the following forbidden lines from the atomic ground states may probably be present in the auroral luminescence. The OII doublet ($^2D^0_2 - {}^4S_{2,3}$) ($\lambda = 3728{\cdot}6$), the OIII lines ($^1S_0 - {}^1D_2$) (4362) and ($^1D_2 - {}^3P_2$) (5003), the NII lines ($^1S_0 - {}^1D_2$) (5751), ($^1D_2 - {}^3P_1$) (6526) and ($^1D_2 - {}^3P_2$) (6543) and finally, the NI-line ($^2P_{1,2} - {}^4S^0_2$) (3469·4) as suggested by Bernard.

These results indicate that nitrogen and oxygen atoms in different states of ionization are present in the auroral region and that the physical conditions in this region are such that lines corresponding to forbidden transitions from the metastable ground states of OI, OII, OIII *and* NI *and* NII *appear in the auroral spectrum.*

In addition, some auroral lines are observed which correspond to transitions from higher levels of OI, OII, NI and NII.

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Bode's Law and the Systems of the Planets and Satellites

IN my letter in NATURE of February 5 (**141**, 245), I pointed out that a slight alteration in the usual form in which Bode's Law is stated leads to some interesting results in Saturn's satellite system. As the amended method of stating the law assists in certain conjectures regarding the satellites of Jupiter