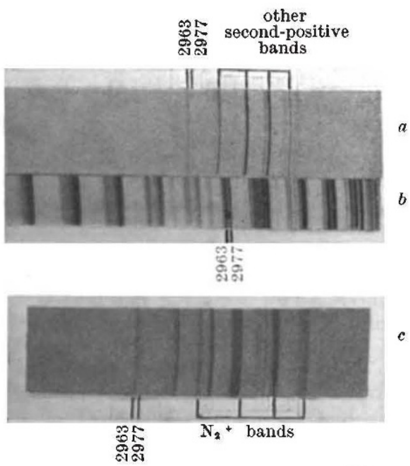
Existence of the Bands 2963, 2977 in Night Sky Spectra

THE list of wave-lengths in the light of the night sky, which was reported by Gauzit[1] two years ago, includes the two second positive bands of nitrogen 2963 and 2977 with an intensity ratio of 2 to 1. Since those bands lie in the region of the great Hartley absorption band of ozone, the reality of those observations could readily be open to question. The importance of additional evidence concerning this problem is understood when it is pointed out that the shortest auroral radiation which has been reported is the second positive band at 3110.

If the 2963 band has really been observed by Gauzit, it would mean that this radiation originates lower in the atmosphere than most auroral displays. Recent afterglow pictures, taken at very high pressures, show these two bands and the remaining band of the sequence, with about the same relative intensity as that reported by Gauzit, and not at all like the intensity distribution in the electrical discharge in which 2977 is at least as intense as 2963. These are shown in the accompanying figure.



a, HIGH PRESSURE AFTERGLOW, ABOUT 20 MM.; *b*, DISCHARGE; *c*, MEDIUM PRESSURE AFTERGLOW, ABOUT 1 MM.

The successful reproduction of this unusual relative intensity in the afterglow gives additional evidence that the bands observed by Gauzit are real. In addition, one must conclude that the second positive bands in the night sky originate low in the atmosphere, otherwise it would have been impossible to observe them; and finally, one can conclude that the light of the night sky is really like the chemiluminescence which is responsible for the production of these afterglows.

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[1] J. Gauzit, *J. Phys. et Rad.*, **5**, 527 (1934).

An Anomalous Change in the Electric Resistance of Iron-Silicon Alloys with a Longitudinal Magnetic Field at Various Temperatures

THE electric resistance of Fe-Si alloys was measured in a longitudinal magnetic field at various temperatures. The specimens were annealed at 1000° C. for one hour and re-annealed at 850° for one hour after setting them on the measuring apparatus.

The relation between the changes in resistance and temperatures at a constant field of 1,500 oersteds for 1·66 per cent and 9·43 per cent silicon alloys was obtained as shown in the following table.

1·66 per cent silicon		9·43 per cent silicon	
t (° C.)	*R*/*R* × 10²	*t* (° C.)	*R*/*R* × 10²
− 195	− 0·055	− 195	− 0·135
− 95	− 0·025	− 95	− 0·133
10	0·010	10	− 0·103
100	0·040	100	− 0·076
201	0·075	200	− 0·059
300	0·075	300	− 0·024
402	0·070	401	− 0·011
505	0·065	499	0·001
592	0·048	599	− 0·010
703	0·019	643	− 0·050
745	− 0·022	650	− 0·080
776	− 0·116	660	− 0·142
789	− 0·177	670	− 0·029
801	− 0·020	690	− 0·010
820	0·000	720	− 0·003

From this table, we see that the resistance decreases with the longitudinal magnetic field at temperatures other than in the vicinity of the Curie point, which phenomenon was not observed in the alloys of Ni-Cu[1], Ni-Co[2] and Fe-Ni[3] previously investigated. The decrease of resistance in solid solution alloys is a very interesting fact, which has not heretofore been observed by investigators. This phenomenon has been also observed in Fe-Al alloys. The complete report of the present investigation will shortly be made in the Science Reports of the Tôhoku Imperial University.

In conclusion, I wish to express my cordial thanks to Prof. K. Honda, president of the Tôhoku Imperial University, and to Prof. H. Masumoto, under whose kind guidance the present investigation has been carried out.

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[1] Masumoto, H., and Shirakawa, Y., *Sci. Rep. Tôhoku Imp. Univ.*, **25**, 104 (1936).
[2] Shirakawa, Y., *Sci. Rep. Tôhoku Imp. Univ.*, Honda Anniv. vol., 362 (1936).
[3] In the Press.

Gamma to Alpha Transformation in Iron Alloyed with Palladium

THE gamma to alpha transformation of iron is of fundamental importance in the heat treatment of steels. The face-centred-cubic gamma form, stable at high temperatures, transforms so rapidly to the body-centred-cubic alpha form below 906° C. that it cannot be preserved by quenching. Various alloying elements stabilize the gamma phase so that it may be obtained at room temperature as a stable or metastable form.

Carbon is of predominating importance among these elements. It is soluble to a considerable extent in gamma iron, being dissolved interstitially, but is almost insoluble in alpha iron. Consequently, austenite (gamma iron containing dissolved carbon) tends to decompose below the transformation temperature into alpha iron plus a carbon-rich phase which is cementite, Fe_3C, or graphite. For low carbon contents, this reaction takes place too rapidly to