the groups of σ or π components, J, $J+\Delta J$ the inner quantum numbers, and g_1, g_2 the magnetic factors, their formulae may be written (after a little algebra)

$$\Delta J=-1 \quad 2B_\sigma=(J+1)g_1-(J-1)g_2$$
$$B\pi=0$$
$$\Delta J=0 \quad 2B_\sigma=g_1+g_2$$
$$(4/3)B\pi=\pm(g_1-g_2)\frac{J(J+1)}{J+\frac{1}{2}}F.$$

When J is integral, $F=1$; when J is half-integral (even multiplicity) $J=1-(1)/16J^2(J+1)^2$. This factor lies between 0.995 and 1, and may be neglected, except when $J=\frac{1}{2}$.

Substituting Landé's value, $g=3/2+[S(S+1)-L(L+1)]/2J(J+1)$ and using J, L to denote always the *greater* of the two values involved in a transition, we find easily

	B_σ	B_π
Ordinary multiplets	$\frac{3}{2}-L/2J$	0
Diagonal lines		
First satellites	$\frac{1}{2}(g_1+g_2)$	$3L/(2J+1)$*
Second satellites	$\frac{3}{2}+L/2J$	0
Symmetrical multiplets		
Diagonal lines	g	0
Satellites	$\frac{3}{2}$	0

*When $J=\frac{1}{2}$, $B_\sigma=(4/3)L$

These formulae are remarkably simple. It is noteworthy that they do not involve S, except in the case of B_σ when $\Delta J=0$. It is only in this case that unresolved patterns can give any information about the multiplicity.

Even for resolved patterns, B_σ has a definite physical meaning; it is the weighted mean magnetic shift for all the radiation of a given state of polarization. It is noteworthy that these quantities come much nearer to satisfying Runge's rule of "simple denominators" than do the shifts for individual components.

Henry Norris Russell

Princeton University,
October 24, 1930.

Raman Effect of HBr and HI

With R. W. Wood's method (Phil. Mag. **7**, 744 (1929)), a long mercury arc and a long tube containing gas at atmospheric pressure, we have measured modified lines scattered by HBr and HI, using a Hilger constant deviation spectrograph and iron arc standards. HBr lines were scattered from 4047 and 4358, HI from 4358 only, as all radiation of shorter wave-length had to be filtered out to decrease photochemical decomposition.

The shifts of the Raman lines, corresponding to (0, 1) vibrational transitions, are, according to these measurements: HBr 2556, HI 2233 vacuum wave-numbers. The value of the center of the HBr vibration—rotation band is, according to Imes (Astrophys. J. **50**, 251 (1919)), 2559. The center of the vibration—rotation band of HI has yet to be determined in absorption, though Czerny (Zeits. f. Physik **44**, 235 (1927)) concluded that his measurements indicated it around 4.4μ (about 2270 wave numbers).

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A. Sandow

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October 25, 1930.

Absorption and Collision Broadening of Resonance Radiation

In a recent paper in the Physical Review,[1] an expression was given for the optical absorption coefficient of a gas under conditions in which Doppler broadening of the absorption line was superimposed on collision broadening. The object of this letter is to mention that a similar expression was given by F. Reiche in a paper[2] with which I was not acquainted at the time. It can be readily shown that the two expressions are mathematically identical.

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Kaiser Wilhelm Institut
für Physikalische Chemie,
Berlin–Dahlem, October 20, 1930.

[1] Zemansky, Phys. Rev. **36**, 219 (1930).
[2] Reiche, Verh. d. D. Phys. Ges. **15**, 3 (1913).

On the Incomplete Polarization of the Mercury Resonance Radiation

It has been shown by Ellett and McNair (Phys. Review **31**, 180, 1928), that the incomplete polarization (80%) of the mercury resonance radiation in zero magnetic field is due to the unpolarized radiations of the two outer components of the hyperfine structure of the 2537A mercury resonance line. According to these authors, the unpolarized part