

rotational levels² it is possible to compute the transition probabilities of the rotational levels, since the Boltzmann factor is exactly known. According to Mulliken, these bands are a $^1\Sigma - ^3\Sigma$ combination, the ground level of the molecule being the $^3\Sigma$ state. The lines obey the following relations:

$$P_2(j) = F'(j) - F_2''(j+1); \quad R_2(j) = F'(j) - F_2''(j-1) \\ P_3(j) = F'(j) - F_3''(j); \quad R_1(j) = F'(j) - F_1''(j)$$

The intensity relations (not hitherto known for inter-combination bands of this type) which are found to hold are as follows (omitting the Boltzmann factor $e^{-E/kT}$)

$$\text{Intensity of } P_2(j) = \frac{1}{2}(j+2) \quad R_2(j) = \frac{1}{2}(j-1) \\ P_3(j) = \frac{1}{2}(j+1) \quad R_1(j) = \frac{1}{2}(j)$$

For small values of j , there are small deviations which we believe to be real and which are proportional to reciprocal values of j . The summation rule $P_2(j) + P_3(j) + R_2(j) + R_1(j) = 2j + 1$ is therefore obeyed only for the higher values of j . The mean error of the measurements, of which a full account will be given later in the *Zeits. f. Phys.*, is about 3.4 per cent.

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¹ R. Frerichs, *Zeits. f. Phys.*, **31**, 305; 1925.

² R. M. Badger u. R. Mecke, *Zeits. f. Phys.*, **60**, 59; 1930.

The Hybridity of *Drosophila melanogaster*.

I AM very much attracted by Prof. Jeffrey's remarks in NATURE of Mar. 15 on the hybridity of *Drosophila melanogaster*, partly because I also think hybridisation (internal or external) of great evolutionary importance. But the tangle of genetical and cytological literature has obscured so many of the issues involved that I feel Prof. Jeffrey would do us a great service in elaborating some of his ideas and defining others.

What, for example, is a hybrid? How are we to define it and how are we to recognise it? These are questions that Prof. Jeffrey with his clear-cut ideas will be able to answer directly. The working geneticist and cytologist cannot deal with them so easily. He cannot see the wood for the trees.

One would like to know also in simple terms how variation is connected with hybridity in, say, *Drosophila melanogaster* and *Oenothera lamarckiana*? Is it what Mendelians call 'segregation'? Or is it due to crossing over? Or can we perhaps ascribe it to an irritability of the germ plasma induced by the hybrid condition? If we knew these things we might be able to make some notable generalisations.

Again, with regard to the pairing of chromosomes, I agree with Prof. Jeffrey in attaching great importance to failure of pairing, but I hesitate to give it a general cause. Does it happen for the same reason in *Drosophila*, *Oenothera*, *Drosera*, and *Tradescantia*? Perhaps Prof. Jeffrey can show that it is always due to hybridity, and that will be a great help in understanding meiosis. Perhaps he can show, also, that lagging chromosomes are always due to the same condition.

Finally the student would like to know what Prof. Jeffrey thinks of the criticisms of *Drosophila* workers, such as Metz, Bélař, Huettner, Guyénot and Naville, and Zuitin. Are their suggestions, that Prof. Jeffrey's lagging chromosomes in *Drosophila* are really cytoplasmic bodies, to be taken seriously, or are they merely irrelevant?

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Raman Effect in Water.

In a previous communication (NATURE, Nov. 16, 1929) the peculiar changes in the Raman bands for water in solutions of nitric acid were mentioned. Work with many other strong electrolytes, acids, bases, and salts, has confirmed this behaviour. Study of the bands with ice and with water at higher temperatures has revealed interesting features connected with this. Pure water gives three bands corresponding to infra-red wave-lengths of about 3.12, 2.93, and 2.79 μ , which are diffuse and merge into one another. In electrolytic solutions, however, these three bands become sharper with increasing concentration of the electrolyte. The band corresponding to 3.12 μ gradually diminishes in intensity until, in very concentrated solutions, it entirely disappears. On the other hand, the band corresponding to 2.79 μ , which is the weakest of the three in pure water, becomes stronger in intensity with increasing proportion of the electrolyte, until, in very strong solutions, it becomes equal in intensity to the central band, which is the most intense of the three in pure water.

A study of the variation with temperature of the distribution of the intensities of these three bands has shown a similar behaviour, the band corresponding to 3.12 μ diminishing in intensity with increasing temperature, while that for 2.79 μ increases. Crystalline ice has shown an entirely different behaviour. The intensity of the central band is the same as in water. But the band corresponding to 3.12 μ is stronger in intensity than in water, the band for 2.79 μ being weaker still in ice. Thus the behaviour of water in electrolytic solutions, instead of being similar to that in crystalline ice, is exactly opposite to it. It behaves more like water at higher temperatures. This is a surprising result, being contrary to existing ideas regarding the nature of water in solutions.

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Dipole Moment of some Organic Halides.

In a note published in NATURE (Mar. 16, 1929), Prof. P. N. Ghosh pointed out from the results of Mahanti and Das Gupta (*Ind. Jour. Phys.*, **3**, 467; 1929) that the OH-radical is mainly responsible for producing the dipole moment in the case of the saturated normal alcohols, whether the carbon chain is open or closed, long or short. Recently (in a paper communicated to *Phys. Zeit.*) Mahanti has shown that the dipole moment is sensibly constant for a homologous series and its magnitude depends on the nature of the polar group, radical, or atom in the corresponding homologues. According to his view, all the alkyl chlorides should have a dipole moment of the order of 2×10^{-18} e.s.u. and the bromides of the order of 1.79×10^{-18} e.s.u. I have determined the dipole moments of a few organic halides by a heterodyne method and they agree well with the views and results of Mahanti. They are:

	$\mu \times 10^{18}$
Propyl chloride	2.07
Allyl chloride	1.99
Propyl bromide	1.78

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