

Letters to the Editor.

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An Early Reference to Mendel's Work.

THE rediscovery of Mendel's classic "Versuche über Pflanzen-Hybriden" must undoubtedly be attributed to the references made to it by Focke in his "Pflanzenmischlinge" (Berlin, 1881). As Dr. Iltis points out in his recent life of Mendel, the fresh movement towards crossing experiments at the end of last century inevitably sent workers to the "Pflanzenmischlinge," where, unless they were either hasty or careless, they could scarcely fail to come across one or more of the half-dozen references to Mendel's name. But how came Focke to light upon a paper which was so securely buried? Apparently Dr. Iltis propounded this question to Focke himself, who replied that he had come across it in the literature of 1870, but could not then say where. ("Auf Mendels Arbeit bin ich durch die Literatur der 70er Jahre aufmerksam geworden, kann aber nicht sagen, wo ich sie erwähnt gefunden habe"—Iltis' "Life of Mendel," p. 204).

I wish to suggest that the reference which escaped Focke's memory is to be found in H. Hoffmann's "Untersuchungen zur Bestimmung des Werthes von Species und Varietät," Giessen, 1869. On p. 136 of this work Hoffmann refers to Mendel's "sexjährige Beobachtungen," though for him the point of most interest appears to have been the evidence that *Pisum* is generally self-fertilised. Mendel's results are dismissed in the brief sentence "Hybride besitzen die Neigung, in den folgenden Generationen in die Stammarten zurückzuschlagen." Prof. Hoffmann was evidently looking for something else.

It is worthy of note that he makes no mention of Mendel's experiments with *Phaseolus*, though a considerable part of his essay is taken up with his own experiments in growing and crossing different forms of this genus. These experiments of Hoffmann are discussed by Darwin in his "Cross- and Self-Fertilization" (2nd edition, 5th impression, p. 151), so that Darwin must have had in his hands a brochure which contained a reference to Mendel's work only four years after its publication. R. C. PUNNETT.

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Valence Theories and the Magnetic Properties of Complex Salts.

NATURE of September 5, containing the letter of one of us and the courteous criticisms of Dr. Jackson, reached the library of the Institute at the very time that we were engaged in a task suggested in Dr. Jackson's note. When writing on July 23, we were of the belief that it would be impossible to explain magnetic anomalies in complex salts until detailed information should become available regarding the orientations of the orbital planes. It was the explanation given by Oseen¹ of Ingersoll's non-magnetic nickel which suggested to us that the problem might be simpler. It suggested that we need only to consider the number of electrons in certain levels associated with the central metal atom, and that we may, for the present purpose, disregard the matter of orientation.

¹ *Zeit. f. Phys.*, 1925, 32, 940.

The Kossel and Lewis-Langmuir valence theories are a guide in determining the number of electrons which the central atom of the complex may obtain from or give to the groups or radicals in the compound. They have been used with success by several investigators to account for the behaviour of complex salts as electrolytes. We have made most use of a paper by Sidgwick,² but the reader should consult also the papers of Lowry,³ Spiers,⁴ and Brockman.⁵ The ideas of electron sharing, or rather the sharing of orbits, and of electron transfer are explained and illustrated with examples by Sidgwick. Here we shall merely list the number of electrons given to or taken from the central atom by the groups or radicals. Each NH_3 , OH_2 , C_2O_4 and $\text{OC}(\text{NH}_2)_2$ adds 2 electrons, 1 by sharing and 1 by transfer.

The en = $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
and pn = $\text{NH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CH}_3$ groups add 4 electrons each.

Each univalent radical CN, NO_2 , Cl, SCN, etc., within the complex adds 1 electron by sharing. The same radicals outside of the complex remove 1 electron by transfer. Similarly, the divalent SO_3 and SO_4 each remove 2.

K and Na add one by transfer.

Finally, it can be deduced from the "octet" theory that CO contributes 2 electrons by sharing, and that NO, when it enters the complex, contributes 3, 1 by transfer and 2 by sharing.

We shall now apply this scheme of addition and removal to many of the salts which have been studied magnetically, considering first the diamagnetic salts of iron. The iron, with 26 electrons, in the salts $\text{K}_4\text{Fe}(\text{CN})_6$, $\text{Na}_3\text{Fe}(\text{CN})_5\text{NH}_3$, $\text{Na}_4\text{Fe}(\text{CN})_5\text{NO}_2$, $\text{Na}_3\text{Fe}(\text{CN})_5\text{NO}$, and $\text{Fe}(\text{CO})_5$ acquires 10 more, making 36 in all, and thus corresponds to the diamagnetic, rare gas krypton. The formula for another diamagnetic salt $\text{Na}_5\text{Fe}(\text{CN})_5\text{SO}_3$ does not seem to be correct from our present point of view. From this view-point, also, $\text{Na}_3\text{Fe}(\text{CN})_5\text{OH}_3$ should be diamagnetic. As mentioned in the previous letter we have had trouble with this salt, and some samples have been nearly neutral towards the magnet.

Next, consider the 64 cobalt compounds measured by Rosenbohm.⁶ All but two are diamagnetic. The two exceptions are so slightly paramagnetic that the magneton number may be taken to be zero. Disregarding 8 of these cobalt compounds which are, as Rosenbohm remarks, of doubtful composition, we find, in all cases, that the cobalt atom acquires 9 electrons and attains the krypton configuration of 36.

The same investigator measured three salts of ruthenium and two of rhodium. In these the metal atom takes on the configuration of xenon, atomic number 54, since ruthenium obtains 10 electrons and rhodium 9 from the attached groups and atoms. He found the salts of iridium and of quadrivalent platinum to be diamagnetic. Considerations such as the foregoing show that iridium, atomic number 77, and platinum, atomic number 78, acquire 9 and 8 electrons, respectively; thus achieving the configuration of niton with 86 electrons. Two of Rosenbohm's four platinum salts in which the metal appears to be divalent, indicate that 6 electrons are added, giving the configuration of polonium with 84 electrons. We do not care to venture an opinion as to the possibility of the polonium configuration; nor are we informed as to its magnetic properties.

It is interesting to note that $\text{Ni}(\text{CO})_4$, which, according to Oxley, is diamagnetic, and $\text{K}_3\text{Co}(\text{CN})_6$,

² *Jour. Chem. Soc., Trans.*, 1923, 123, 725.

³ *Chem. and Ind.*, 1923, 42, 316.

⁴ *Chem. and Ind.*, 1923, 42, 534.

⁵ *Chem. and Ind.*, 1924, 43, 756.

⁶ *Zeit. f. phys. Chem.*, 1919, 93, 693.