the other cell, one heteromorphic trivalent, one heteromorphic bivalent, one open bivalent, five ring bivalents and six univalents.

Apart from these two cells, each having a total of 21 chromosomes, all the other (320) cells on the slide appeared to have the normal number, 42, or thereabouts. The two cells (if none was lost) probably arose through pre-meiotic reduction. If such be the case, the pairing behaviour of the members of the genoms in the two cells is, to say the least, unexpected. Gaines and Aase[2] reported the occurrence of 0–3 bivalents in their *vulgare* wheat haploid, and Yamazaki[3] 0–4 bivalents and the occasional trivalent in his *vulgare* wheat haploid.

Dr. Lillian Hollingshead[4] mentioned the rare occurrence of aneuploid pollen mother cells in *vulgare* wheat hybrids, recording "clear instances of one bivalent and seven univalents, three bivalents and ten univalents, five bivalents and eight univalents, and eight bivalents and eight univalents". Such aneuploid cells could arise secondarily from pre-meiotic reduced cells such as are reported above.

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The $M_{IV,V}$-Absorption Edges of Protactinium (At. No. 91)

PROF. HAHN has put at our disposal a quantity of a protactinium preparation, which he has separated from Jáchymov pitchblende residues.

A spectrogram of the M_V-absorption edge of protactinium, showing clear secondary fine structure, is reproduced herewith. This structure has not been observed in the M-series hitherto. It has been obtained with the ionic tube for low tension[1] in connexion with the focusing method[2]. We have measured the M_V edge in the second order with reference to tungsten M-lines and obtained the values:

$$\lambda = 3601 \text{ X.U.} \quad \nu/R = 253{\cdot}1 \quad \sqrt{\nu/R} = 15{\cdot}91.$$

For the fine structure we find the following energy differences from the main edge:

(11) 16 35 51 76 volts.

In the position where the M_{IV} edge might be expected, we find an edge with similar fine structure to that of M_V, for which we have obtained:

$$\lambda = 3429 \text{ X.U.} \quad \nu/R = 265{\cdot}8 \quad \sqrt{\nu/R} = 16{\cdot}30.$$

The energy differences of the fine structure edges are:

5·4 17·5 23 36 volts.

By comparing the measured value $\nu/R = 265{\cdot}8$ with that interpolated for M_{IV} of the elements of atomic number 90 and 92, which is $\nu/R = 265{\cdot}1$, it appears, however, that there is a slight difference between them. This variance might have been caused by the fact that at the same position there appears also the K-absorption edge of potassium from the compound (K_2PaF_7). But we have not been able to find any trace of the edge precisely in the position of the interpolated value for M_{IV} and also we are unable, even after observing several spectrograms, to differentiate one from the other. So we are not in a position to decide whether this fine structure is of the M_{IV}-edge of protactinium or that of the K-edge of potassium.

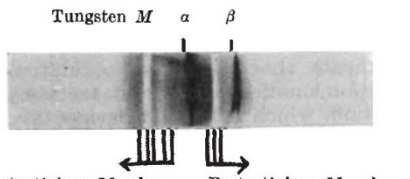

FIG. 1.

If we now compare the measured values of the M_V-edge with those calculated from the values, $M_V = L_{III} - L\alpha_1$, we obtain the following results[3]:

At. No.	M_V edge (measured)	M_V edge (calculated)	Diff. (meas.—cal.)
92	261·0	261·3	−0·3
91	253·1	253·6	−0·5
90	244·8	245·0	−0·2

From these results it can be seen that, within the limits of observation, there is no difference between the measured and the calculated energy values.

It has been shown[4] that there exists a systematic difference, which is about ν/R meas. $- \nu/R$ cal. $= +3$, between the directly measured energy values of the M_V and M_{IV}-edges of the elements from atomic number 83 downwards and their corresponding values calculated from the L-edges. But as our results testify, such a difference does not exist in the case of the highest three elements. It can also be shown from the above results that the same fact is valid for the M_{IV}-edges of the highest three elements.

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Research and Teaching in Universities

I CANNOT pass unchallenged the remark quoted from Dr. R. Coulborn's article in the *Nineteenth Century* of July in NATURE of August 22 (p. 304), namely, "the numbing influence of research upon character". This is surely not only untrue but also dangerous. In my experience, the contact with a research problem has proved to be a fine training for a young man, as it provides just the stimulus needed to convert his mind from the text-book outlook upon life to the realities. If it be 'numbing' to teach him proper humility and the scope of his actual knowledge, then let us have more of such refrigeration. Of course, he is not so likely to deal comfortably in