conductivity at a constant temperature below the transition point is increased by a magnetic field. It might be possible, that the thermal conductivity is constant in a magnetic field below the critical field found in our experiments and increases in higher fields till the supraconductivity is completely disturbed. The existing data on the thermal conductivity of $PbTl_2$ are in very good agreement with this hypothesis. Other alloys [1]), however, which have not yet been investigated as to their magnetic properties, show a different behaviour of thermal conductivity in a magnetic field.

1) H. BREMMER, Thesis Leiden 1934.

Biochemistry — *The molybdenum content in leaves.* By H. TER MEULEN and Miss H. J. RAVENSWAAY.

(Communicated at the meeting of December 22, 1934.)

Small amounts of molybdenum occur regularly in plants [1]), especially in the seeds, but also in other parts. Even aquatic plants, growing in surroundings which contain but extremely few traces of molybdenum, draw from these notable amounts of this element. [2])

It has appeared from the analyses of several specimens of soil that the most fertile are the richest in molybdenum. Lately we found an instance of this while examining the soils of two tobacco plantations in the Dutch East Indies. Tobacco contains relatively much molybdenum; in three samples of Turkish tobacco we found 0.53, 0.54 and 0.72 mgr. Mo per kilo, and this induced us to analyse the soil used for growing tobacco. Eight samples were analysed and the four with the larger amount of molybdenum (0.134, 0.305, 0.170 and 0.120 mgr. per kilo) proved to denote a better soil for growing tobacco than the four with the smaller content (0.026, 0.013, 0.073 and 0.048 mgr.)

The above mentioned facts justify the supposition that molybdenum must be considered as a necessary constituent of the plants.

We now proceeded to determine the content of molybdenum in leaves at several periods of their growth in order to contribute to the solution of the problem, whether the mineral nutrients tend to migrate back into the branches in the autumn.

Formerly this was supposed to be the case; C. WEHNER [3]) opposed this opinion and with good reason criticised the interpretation of the results obtained by the analyses. Wrongly the amount of mineral nut-

1) Rec. Trav. Chim. des Pays Bas 50 (1931) 491.
2) Rec. Trav. Chim. des Pays Bas 51 (1932) 549.
3) Ber. Deutsche Bot. Ges. X (1892) 152.

rients used to be calculated as a percentage of the total ash. It is obvious that, as the content of ash increases considerably towards the time of the autumn leaf-fall — especially the amount of silica and calcium-salts — a lower percentage of potassium and phosphate will be found, even if the amount of these had not decreased in the autumn. Therefore WEHNER suggested not to report the percentage, but the weights of the various constituents contained in 1000 leaves, and by doing so it turned out that the content of mineral nutrients remained rather constant from May till September; he put down the small decrease, which was recorded in October and November, to the leaching by rain or dew.

From an extensive research of the leaves of 23 different species of trees J. C. Mc HARGUE and W. R. ROY[1]) also found that mineral nutrients do not migrate from the leaves to the branches towards the end of the growing season.

In our investigation we analysed the leaves of the green and copper beech, Virginian creeper, lime-tree, poplar, lilac bush, green and purple prunus (*Prunus serrulata* LINDL and *Prunus cerasifera* EHRH), green and purple hazel and horsechestnut.

At the end of May, 1 to 2 kilos were sampled and the amounts of dry matter, ash and molybdenum were determined; at the same time the leaves were counted, so that the weight of 1000 leaves was known. The analyses were made in duplicate, and as a rule gave very good corresponding results.

Towards the end of October the leaves of the same trees, and as far as possible, from the same spot as before, were sampled once more at the very moment when they were about to fall; with these leaves the same analyses were performed. The data are shown in Table I.

TABLE I.

Leaves of	I	II	III	IV	V	VI
Virginian creeper May	5260	15.3	2.10	0.26	110	0.21
„ „ Oct.	7200	24.5	4.20	0.33	302	0.57
Lime-tree . . . . May	458	23.9	1.60	0.40	7.3	0.044
„ . . . . Oct.	790	37.1	4.70	0.19	37.1	0.055
Poplar . . . . . May	173	20.5	2.05	0.13	3.5	0.0047
„ . . . . . Oct.	443	35.5	4.20	0.17	18.6	0.027
Lilac bush . . . May	429	27.1	1.56	0.085	6.7	0.010
„ „ . . . Oct.	630	31.7	3.10	0.126	19.5	0.025

[1]) The Botanical gazette XCIV (1933) 381.

TABLE I. (*Continued*).

Leaves of	I	II	III	IV	V	VI
Green prunus . . May	715	31.7	1.55	0.07	11.1	0.016
„ „ . . Oct.	695	34.2	3.10	0.125	21.5	0.030
Purple prunus . . May	158	37.8	2.90	0.16	4.6	0.010
„ „ . . Oct.	240	37.3	4.00	0.32	9.6	0.029
Green hazel . . . May	306	31.0	2.68	0.26	8.2	0.025
„ „ . . . Oct	539	49.0	5.70	0.29	30.7	0.075
Purple hazel . . . May	553	31.0	2.08	0.58	11.5	0.10
„ „ . . . Oct.	682	37.5	3.59	0.53	24.5	0.136
Horsechestnut . . May	11150	17.9	1.22	0.446	136	0.89
„ . . Sept.	9250	32.1	3.35	0.25	310	0.74
„ . . Oct.	5600	32.0	4.90	0.17	275	0.30
Green beech . . . May	222	35.8	1.70	0.11	3.8	0.009
„ „ . . . Oct.	180	46.2	3.80	0.11	6.8	0.009
Copper beech . . May	398	33.2	1.40	0.24	5.6	0.032
„ „ . . Sept.	329	46.4	3.75	0.17	12.3	0.026
„ „ . . Oct.	305	47.2	4.40	0.23	13.4	0.034

I. Weight of 1000 leaves in gr. II. Percentage of dry material. III. Percentage of ash. IV. Mgr. of Mo in 1 kilo dry material. V. Gr. of ash in 1000 leaves. VI. Mgr. of Mo. in 1000 leaves.

In all the leaves, with the exception of those of the horsechestnut, the content of Mo per 1000 leaves had either remained equal or showed an increase, which was in some cases rather high. The decrease in the amount of molybdenum in the horsechestnut leaves, which is already noticeable in September, is much more marked in October. Perhaps the reason is to be found in the growth of the fruits. As horsechestnuts contain 0.14 mgr. Mo per kilo moist material, it is possible that the fruits extract part of the molybdenum from the leaves.

We also analysed the leaves of sugar-cane kindly placed at our disposal by Prof. G. VAN ITERSON. The plants bore young, mature and totally withered leaves at the same time. As the leaves differed considerably in size, we did not report the amount of Mo per 1000 leaves, but we calculated it as mgr. per kilo dry matter.

TABLE II.

Sugar-cane	% of dry matter	% of ash on dry matter	Mgr. of Mo per kilo
Young leaves	37.2	8.35	0.38
Mature leaves	35.0	10.3	0.37
Withered leaves	77.6	14.3	0.61

The results obtained showed that in eleven cases out of twelve the content of molybdenum in the leaves remained constant or even increased. So, as a rule, molybdenum does not migrate from the leaves to the branches in the autumn.

Finally we wish to draw attention to the relationship between the colour of the leaf and its content of molybdenum. Anticipating this possibility, we included in our investigation a brown as well as a green variety of the beech, the hazel and the prunus. As here too, the sizes of the leaves differed to some extent, we recorded the amount of Mo in mgr. per kilo moisture-free material. The green and the brown leaves were plucked on the same day.

The following table shows the results:

TABLE III.

	Mo in mgr. per kilo	
	May	October
Copper beech	0.24	0.23
Green beech	0·11	0.11
Purple hazel	0.58	0.53
Green hazel	0.26	0.29
Purple prunus	0.16	0 32
Green prunus	0.07	0.13

It is worth noticing that the brown-leafed varieties contain about twice as much Mo in their foliage as the green ones.