Soil and Health Library

Part Three.

RUDOLF STEINER'S SUGGESTION FOR A RENEWAL OF AGRICULTURE

INTRODUCTION

In June 1924 Rudolf Steiner gave a series of lectures to a meeting of farmers and gardeners on Count Karl von Keyserlingk's estate at Koberwitz in Silesia. He spoke about the various problems of agriculture. In the introductory lecture he pointed out how far-reaching the interests of agricultural life are, how nearly all the different branches of human life are connected with agriculture, how many spheres of life are touched by it.

How completely wrong it is only to take into consideration the immediate surroundings of a beetroot or a turnip, for example. For the plant is dependent in its growth on influences which are not to be found on earth, but which are streaming in from the cosmos. We try to arrange and explain many things as though we had only to deal with them within their narrow limits, and not with the whole universe. Already in his first lecture Dr. Steiner sketched a picture of agriculture reaching far beyond our earth, touching the stars. He stressed the necessity of enlarging our knowledge of plant life, animal life, and the life of the whole earth, and of extending it to an intimate knowledge of the whole cosmos.

After his lectures there was always an opportunity for the farmers and gardeners to discuss the different problems dealt with in the lecture, and to ask questions; it was amazing to hear Dr. Steiner's replies about all their many problems.

Only eight lectures were given, but they contain the fundamental principles for a new agriculture. Some of the farmers and gardeners undertook to start making use of Dr. Steiner's suggestions immediately on their farms. Some time later Dr. Steiner entrusted me with the task of making the necessary scientific investigations. Twenty years have passed and I have tried to carry out as much as was possible. More could have been done if there had been more financial help.

L. KOLISKO.

Chapter I.
COW MANURE SPECIALLY PREPARED IN A COW-HORN.

How to use this concentrated cow manure

Experiments

(1.) 1930 with sunflower seeds treated with this prepared manure, potentized to the 60th potency.

(2.) The same experiment repeated in 1931. (3.) The same experiment carried out with gladioli, 1931.

(4.) Comparative experiments with prepared and fresh cow manure, and a well-known chemical fertilizer (superphosphate), carried out with gladioli, 1932.

(5.) Comparative experiments with:

E.1. – Cow manure buried in cow-horn during winter.
E.2. – Cow manure buried in earthenware pot during winter.
E.3. – Cow manure kept in earthenware pot during winter in the laboratory.
E.4. – Fresh cow manure.

(6.) Test with our method of Capillary Dynamolysis (see Chapter XVIII, Part II) to study the difference between prepared and unprepared cow manure.

Cow Manure specially prepared in a Cow-horn during Winter

Perhaps we could say that the problem of agriculture is the problem of manure. How can we keep the soil alive? With each harvest we take life from the soil, and must put it back somehow. The most natural way would be to have a sufficient number of cattle and to use the excretion of the different animals (cows, horses, pigs, chickens, etc.). A really healthy agriculture must be regarded as a unity consisting of a certain amount of land, the appropriate percentage of animals, and the human beings living there. That is the ideal.

But nearly always we find that farmers have not enough cattle, and therefore not enough manure. They must buy it from somewhere else. That means that the farm is no longer in a really healthy condition. Sometimes we buy cow manure from the neighbour who is willing to sell the real thing – so that he may be able to buy chemical fertilizer to get a bigger crop.

The most precious possession of a farmer is the manure. It is the capital he has, to restore life to the soil. We have of course to discriminate between the manure we get from cows, pigs or horses. They vary in their manuring value. The most vital is cow manure. In the chapter "Foot and Mouth Disease", we have tried to give a picture of this animal and need not repeat it here. The cow is the representative animal of the metabolic process. The head is small in comparison with the rest of the body. The chief occupation of a cow is to eat, to ruminate, and to digest; and the excretion is the best we can get for the land. It contains enormous vitality.

Rudolf Steiner suggested making a specific preparation from cow manure, in order still more to concentrate these forces which we need to enliven the soil. In the chapter on "Foot and Mouth Disease", we mentioned the significance of the formation of horns. If an animal produces horns, and hoofs, it means that forces which could otherwise stream out through the skin are pushed back in those places where the organism develops a homy layer instead of the ordinary skin. The forces stream back into the body. The skin can breathe, there is a circulation between the inner

organism and the outer world through the skin but not through the horns. They resist and push back the forces which flow towards them from the inside.

We are advised to take the horn of a slaughtered cow and to fill it with fresh cow manure. Of course it should be the horn of a healthy animal which is not too old. Then we should bury this horn two to three feet beneath the surface of the soil during winter time. We must choose a good soil, rich in humus, which is neither too sandy nor has too much clay.

The cow manure is thus exposed to all those forces which stream through the soil in winter (we refer to Part I, Chapter III). Our experiments with plants growing beneath the surface of the soil show that during winter-time the temperature increases slowly beneath the surface, and wheat plants grow to a certain extent.

Crystallization reaches its maximum strength between January and February. There is much life beneath the surface of the soil, and we also find cosmic influences there; and here we place the cow-horn, filled with cow manure. In spring the preparation is complete. The manure has undergone an intensification and is now a concentrated manure, which can be used in smallest quantities.

How to use this concentrated cow manure

The manure that is now taken out of the horn has lost its smell. At first it is slowly stirred, adding a small amount of lukewarm rainwater, into a thick paste, then the amount of water is increased gradually until it forms a homogeneous thin paste. This is added to a bucketful of lukewarm rainwater, and we begin a vigorous stirring with a wooden stick. We have to mix the manure thoroughly with the water. It is some time before the water is tally permeated with the manure. It must be stirred for at least one hour without interruption, turning the stick round and round in one direction until the water forms a hollow whirlpool in the middle of the bucket; stir it in the opposite direction, and so on for one hour. The solution begins to smell like cow manure again, or rather like a good, fresh soil.

Having finished the stirring, the liquid can be sprinkled over the field. Not much is needed. For one acre of land, one bucket of liquid manure is sufficient. We dip a brush into the bucket, walk through the field, and shake out the brush vigorously to the right and to the left, in rhythmical movements. We soon learn how to do it, and feel how to use this strong vitalizing force.

If this method is introduced in larger areas, an apparatus which would allow a slight sprinkling is recommended, so that only one bucket full of liquid is distributed over one acre of land.

This preparation is applied to the soil before the sowing of the crop. It stimulates the life in the soil and helps the plants enormously in the first stages of germinating and pushing through the soil. It is advantageous if some time elapses between the spraying of this concentrated cow manure and the sowing of the seeds.

The question arises: How can we prove that manure which has been buried during the winter below the surface of the soil, is really different from an ordinary fresh cow manure?

One answer to this question is, that for many years hundreds of farmers and gardeners all over the world have tried this method on their fields, and have realized its strong effect upon the growth of plants. Many controls have been carried out, and each one has proved that the areas treated with this cow manure show a much better and healthier growth, and the crop is considerably increased.

Another answer may be found by studying the effect of this concentrated cow manure with experiments in the laboratory and in the open. The most striking point in Rudolf Steiner's suggestion is that such a small quantity is used: the manure contained in one cow-horn dissolved in about three to four gallons of water should be sufficient to enliven one acre of land. Therefore, our first task is to find out whether cow manure, treated according to Dr. Steiner's suggestions, influences plant growth although used in so high a dilution, that for practical purposes we can hardly speak of a material influence, for the quantity is much too small. Some of our experiments will be described.

(1.) Experiment with Sunflower seeds in 1930

We used the manure of a cow-horn which had been buried from October 1929 until March 1930, three feet beneath the surface of the soil. The content of this horn (32 grams) was stirred into a thick paste with 50 c.c. of lukewarm rainwater; then we slowly added more lukewarm rainwater, until we got an evenly distributed thin paste, which we poured out into an earthenware pot containing 10 litres of previously warmed rainwater. Then we began to stir in the prescribed manner for one hour. This is the preparation all farmers and gardeners should use to enliven their land. It has to be sprinkled over a wide area, so that in reality only here and there the liquid comes into contact with the soil. That means: the force must radiate all over the land.

For our experiment we consider this stirred cow-horn manure as the 1st potency. We take 10 c.c. of this preparation and add 90 c.c. lukewarm rainwater, put it into a perfectly clean glass bottle, and shake this mixture for about five minutes. Having such a small quantity to shake, we need only five minutes to get an even distribution of the concentrated material into the water. This represents our 2nd potency. From this bottle we again take 10 c.c. and add 90 c.c. of fresh lukewarm rainwater, take another clean glass bottle and shake again for five minutes. This is our 3rd potency; and so we proceed until we have finished sixty potencies in sixty bottles.

Then we take sixty-one dishes and pour 20 c.c. of the different potencies into the dishes. One dish is filled with rainwater only. We insert sunflower seeds. The seeds have to be selected carefully to ensure that they are equal in growing energy. We cannot just take any seed that happens to be there. We must look carefully and see that each seed is perfect in shape and colour, and possesses all the qualities that guarantee a healthy plant later on. Selecting the seeds is an art which has to be learnt.

The seeds must remain in these glass dishes until they germinate, which is between twenty-four and forty-eight hours later. During the germination process we already observe considerable differences. Some potencies start the germination very quickly, some of them take a much longer time, and some may even not germinate until after forty-eight hours. It is very important to be sure about the selected seeds – that the retardation in the germination is not due to a less vital seed, but only to the influence of the potency.

The next step is, that the tiny seedlings are transplanted into pots containing ordinary garden soil mixed with leaf mould. We have prepared the soil and the leaf mould and are certain that they do not contain any fertilizers. The plants are allowed to grow in these pots until they are about four inches high, and during these few days they are watered with the respective potencies. After this period the plants are transplanted into the open. The treatment with potencies stops.

We could not use the various solutions in the open, without getting an undesirable mixture in the soil.

The sunflowers are planted in one long row, starting with the water control plants, and then proceeding from the 1st to the 60th potency.

We plant five rows, that means we have for each potency five plants as a control. The plants are measured every fortnight, and if possible we take a photograph later on of the experiment in the open.

The following figures were taken on the 11th September, 1930, shortly before the end of the experiment:

Length of the Sunflowers treated with Potencies of cow-horn manure, 1930

Potency	cm.	Diameter of the top flower cm.	Potency	cm.	Diameter of the top flower cm.
1	252	23.8	31	232	24.0
2	249	22.0	19	237	23.8
3	252	23.5	33	233	23.0
4	248	22.8	34	241	22.7
5	254	25.5	35	240	23.7
6	275	28.8 (13 smaller)	36	238	23.4
7	249	25.0	37	280	27.0
8	235	22.0	38	223	25.0
9	248	23.2	39	213	23.5
10	208	20.0	40	285	27.8
11	240	25.5	41	245	26.0
12	200	22.0	42	232	24.0
13	209	22.0	43	255	25.2
14	130	17.0	44	260	25.5
15	116	15.0	45	276	23.0
16	130	15.5	46	204	24.8
17	126	16.2	47	291	27.0
18	134	16.0	48	217	26.0
19	125	14.0	49	305	28.5
20	200	18.0	50	237	22.5
21	190	18.5	51	127	18.0
22	200	19.2	52	275	26.5
23	211	21.5	53	395	35.0
24	237	22.0	54	390	30.0
25	270	26.5	55	375	32.0
26	213	25.0	56	335	33.0
27	250	27.2	57	398	30.0
28	248	25.3	58	370	28.7
29	267	24.0	59	370	30.0
30	225	23.6	60	385	31.5

The easiest way to see the effect produced by the various potencies is to draw a graph. Therefore, we show the graph (of course very diminished in size) below:

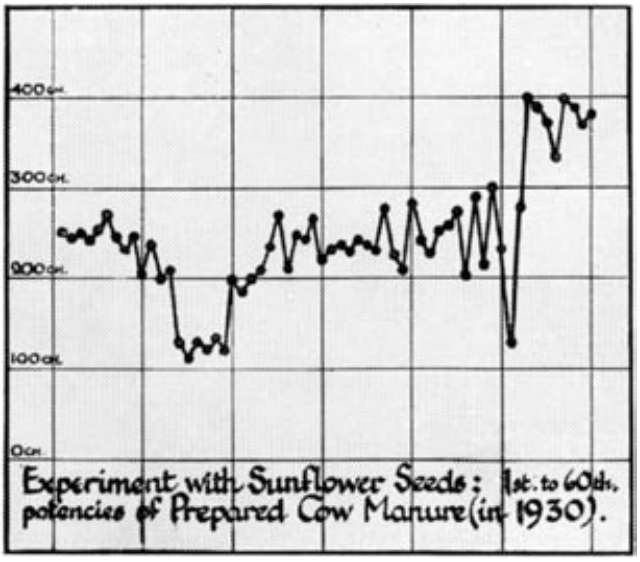


Fig. 171 Sunflower seeds treated with 1st-60th potencies of prepared cow-horn manure (1930)

If we try to describe the graph briefly, we might say that the whole graph is divided into two periods, the first reaching to about the 30th potency, and the second to the 60th potency.

The first period shows an increased growth as far as the 6th potency, then steadily falls to the minima between the 14th and 19th potencies. These potencies do not have a good effect upon the growing process of the sunflowers. Then we reach the first maximum growth at the 25th potency.

The second period indicated by the graph has a very marked minimum at the 51st potency, and the last eight potencies show a maximum growth reaching nearly four metres. That means, the higher we dilute, the stronger the action of the introduced force. We surely cannot speak of a material effect if we have diluted the manure to the 60th potency.

(2.) The same experiment carried out in 1931

We give the figures for the measurement taken at an early stage of development in the month of July:

Potency	cm.	Potency	cm.	Potency	cm.	Potency	cm.
1	202	16	93	31	192	46	164
2	195	17	98	32	188	47	120
3	195	18	92	33	183	48	173
4	205	19	96	34	206	49	223
5	188	20	142	35	196	50	223
6	203	21	145	36	194	51	170
7	174	22	163	37	203	52	192
8	190	23	165	38	178	53	237
9	194	24	200	39	174	54	229
10	189	25	225	40	196	55	225
11	184	26	194	41	196	56	226
12	154	27	202	42	175	57	235
13	152	28	201	43	193	58	241
14	102	29	228	44	192.	59	267
15	90	30	178	45	204	60	269

The graph belonging to this experiment is reproduced below:

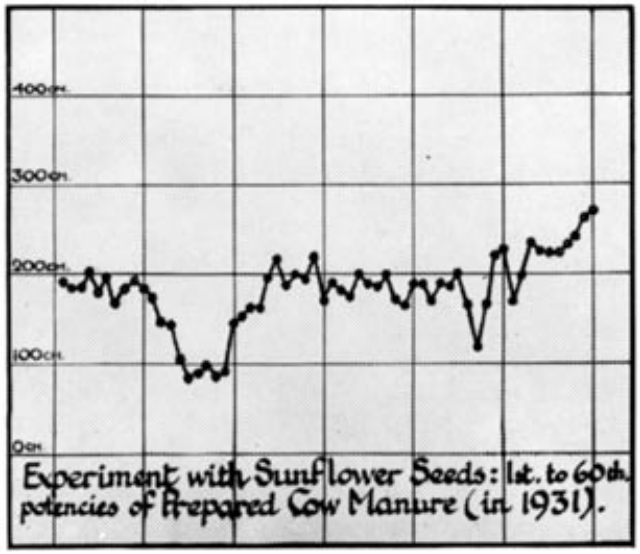


Fig. 172 Sunflower seeds treated with the 1st-60th potency of prepared cow-horn manure (1931)

The result, when compared with that of 1930 is nearly identical. We find the two periods expressed clearly in the graph, the minima between 14th and 19th potencies, the maximum at the 25th, and another one at the 29th potency.

In the second period of the graph we find the minimum at the 51st potency marked, but a stronger one appears at the 47th potency. The last 8 potencies show maximum growth.

(3.) The same experiment carried out with Gladioli. 1931

Here we must select the bulbs in the same careful way. We again use small glass dishes filled with the respective potencies and insert the gladioli bulbs. We use 5 bulbs for each potency (in 5 different glass dishes); that makes 300 glass dishes for the 5 series of experiments and the water control plants.

The bulbs are kept in the solutions until they begin to germinate, then they are immediately transplanted into the open and the treatment with cow manure potencies stops from this moment.

Of course the 5 bulbs we select cannot grow exactly the same length. There are slight differences between the bulbs. To find some hundreds of bulbs of equal vitality we must have thousands to select from. These we cannot buy, so we know that we can only approach the ideal, but do not reach it.

To find out how much these differences influence our result, we make the following experiment. In measuring the 5 plants we select at first all the biggest plants for each potency, then we select the smallest ones and then we take the average of the 5 series.

We quote the figures for the gladioli measured on 9th July, 1931.

G.1=the largest plant of the 5 is selected.

G.2=the average growth of the 5 series.

G.1		G.2		G.1		G.2	
Potency	cm.	Potency	cm.	Potency	cm.	Potency	cm.
1	88.0	1	70.0	31	80.0	31	69.6
2	86.0	2	70.0	32	76.0	32	70.4
3	78.5	3	73.8	33	80.0	33	69.9
4	78.0	4	67.5	34	75.0	34	68.6
5	86.0	5	79.5	35	73.0	35	59.8
6	86.0	6	60.0	36	70.0	36	64.0
7	86.0	7	73.0	37	69.5	37	62.3
8	78.5	8	65.4	38	65.0	38	53.0
9	74.0	9	65.3	39	65.0	39	58.0
10	68.0	10	64.9	40	75.0	40	63.5
11	83.0	11	78.7	41	75.0	41	61.7
12	83.0	12	69.5	42	69.0	42	53.7
13	75.0	13	62.0	43	74.0	43	60.7
14	49.0	14	44.3	44	76.0	44	68.0
15	38.0	15	33.5	45	77.0	45	65.0
16	42.0	16	39.3	46	66.0	46	58.0
17	36.0	17	28.8	47	68.0	47	56.0
18	44.0	18	35.0	48	65.0	48	57.0
19	45.0	19	39.4	49	89.0	49	73.0
20	54.0	20	50.5	50	95.0	50	68.0
21	61.0	21	56.0	51	73.0	51	68.0
22	74.5	22	66.0	52	84.0	52	88.6
23	72.0	23	70.5	53	102.0	53	88.9
24	78.5	24	73.4	54	105.0	54	94.0
25	99.0	25	79.0	55	103.0	55	84.7
26	83.0	26	75.5	56	92.0	56	82.5
27	90.0	27	78.0	57	108.0	57	88.2
28	86.0	28	75.6	58	108.0	58	93.6
29	99.0	29	83.6	59	125.0	59	101.0
30	76.0	30	65.2	60	127.0	60	109.0

Again we make a diminished sketch of the graph and can see at the first glance that there is a great similarity between this graph and that of the experiment with sunflower seeds. The minima are between the 15th and 19th potencies; the first maximum occurs at the 25th, the largest plants are obtained at the highest dilutions.

It is also obvious that we do not make serious errors in the selection of our bulbs, because the differences between the average length of the 5 series, and the series which contains the biggest plants of the 5 controls, are negligible.

Fig. 173 Gladioli treated with 1st-60th potencies of prepared cow manure in 1931 G.1 (the largest Plant is selected)

Fig. 174 Gladioli treated with 1st-60th potencies of cow manure prepared in 1931 G.2 (average of the 5 series)

These questions still remain: (1) **Is it really important to prepare the manure in that strange way?** Would it not be the same if we potentize fresh manure? Or (2) If we bury the manure beneath the soil, must it be in a cow-horn? Can another horn be substituted for the cow-horn, or may we take any other material in which to keep the manure beneath the soil?

(4.) Comparative experiments with prepared and fresh cow manure and superphosphate, 1932

The first question may be answered with a comparative experiment. We again take bulbs of Gladioli and treat them with potencies of prepared manure: Experiment D.1; another series of potencies is made with fresh cow manure: Experiment D.2; and we make a third series with a chemical fertilizer: potencies of Superphosphate (Experiment D.3).

	D.1	D.2	D.3
Potency	Prepared cow manure	Fresh cow manure	Superphosphate
1	92.0	58.0	90.0
2	54.0	49.0	69.0
3	78.0	79.0	63.0
4	74.0	77.0	74.0
5	72.0	76.0	74.0
6	77.0	80.0	103.0
7	77.0	70.0	63.0
8	86.0	96.0	69.0
9	90.0	92.0	94.0
10	87.0	92.0	69.0
11	82.0	87.0	90.0
12	91.0	95.0	105.0
13	85.0	88.0	105.0
14	88.0	92.0	86.0
15	99.0	82.0	79.0
16	84.0	70.0	114.0
17	64.0	56.0	67.0
18	67.0	76.0	74.0
19	87.0	67.0	93.0
20	82.0	79.0	74.0
21	96.0	95.0	47.0
22	108.0	102.0	48.0
23	90.0	86.0	93.0
24	94.0	93.0	113.0
25	116.0	106.0	110.0
26	88.0	92.0	44.0
27	88.0	96.0	88.0
28	100.0	88.0	72.0
29	70.0	92.0	94.0
30	102.0	102.0	68.0

This experiment shows that the prepared cow manure in the 1st potency enhances the growth of the gladioli bulbs much more than the fresh manure. The plant is nearly twice the length (92.0 cm.: 58.0 cm.); then the prepared manure remains slightly behind the fresh manure. The minimum in both series happens to be the 17th potency, the maximum at the 25th. The minimum in D.1 is 64; 56 in D.2, and the maximum in D.1 is 116 : 106 in D.2. So we can read from the graph, that the prepared manure produces a higher maximum and the minimum is not so tiny, as the corresponding plants treated with fresh manure.

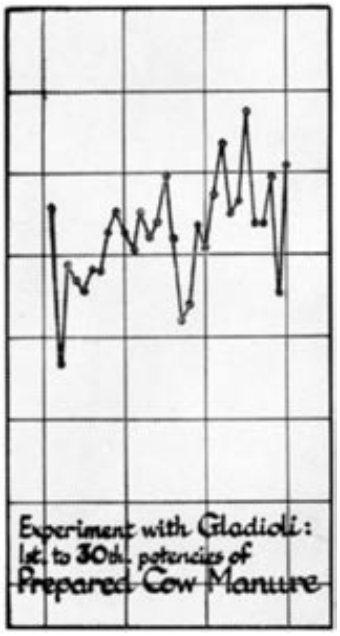


Fig. 175 D.I (Prepared manure)

Fig. 176 D.2 (Fresh cow manure)

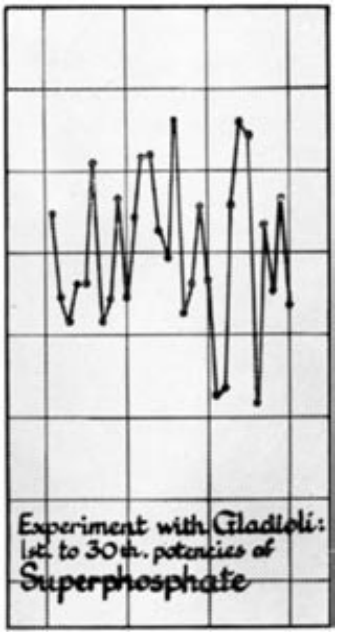


Fig. 177 D.3 (Superphosphate)

The differences between the plants themselves were much more impressive. There was not only a difference in the length, but the whole character of the plants was different in both series. These plants which were treated with the prepared manure looked much stronger and healthier and the leaves were darker green. The vitality of the plant had been raised to a much higher level. Of course these characteristics cannot be seen in the figures and I regret that it is impossible to give the photographs.

It is difficult to compare these with the graph of the superphosphate series in which there are too many minima and too many maxima. We find the 17th potency as minimum, but the same minimum happens at the 3rd, 7th and 30th potencies. But still stronger minima are marked at the 21st, 22nd and 26th potencies.

The first maximum is the 6th, the second the 15th, and the third the 24th potencies. It is very difficult to read this graph. It is unstable; there is a constant up and down movement. The plants themselves gave the same impression. It was puzzling to see rather small and shabby-looking gladioli, with yellow leaves, looking unhealthy, and then very tall ones with rather thin stalks. They had been forced too much. We can only say: that the gladioli do not like a treatment with superphosphate, but they feel very happy with the prepared cow manure.

(5.) Comparative experiments with "prepared" and "unprepared" cow manure, 1933

Someone may raise the objection when we compare "fresh" manure with the "prepared": the difference in the experiment may be entirely due to the age of the manure and not to the special way of keeping it in a cow-horn buried during winter-time three feet below the surface of the soil. We therefore made the following experiment:

E.1 cow manure buried in cow-horn from October 1932 until March 1933.

E.2 cow manure filled in an earthenware pot and buried from October 1932 until March 1933 in the same place where the cow-horn was buried.

E.3 cow manure kept in an earthenware pot in the laboratory between October 1932 and March 1933.

E.4 fresh cow manure.

With these four substances we made again experiments with gladioli bulbs from the 1st to the 30th potencies, and quote below the result obtained:

	E.I Manure buried in cow-horn	E.2 Manure buried in earthenware pot	E.3 Manure kept in earthenware pot in laboratory	E.4 Fresh cow manure
Potency	cm.	cm.	cm.	cm.
1	90.0	55.0	45.0	27.0
2	82.0	57.0	50.0	100.0
3	95.0	75.5	68.0	96.0
4	100.0	78.3	61.0	98.6
5	100.5	78.0	76.2	65.5
6	98.0	65.7	62.5	90.0
7	100.0	58.2	50.0	85.3
8	102.5	73.0	67.5	63.0
9	100.0	60.0	60.3	77.5
10	107.5	63.0	51.0	86.0
11	100.0	72.0	65.0	87.5
12	90.0	41.5	37.0	36.0
13	105.0	75.0	55.3	70.0
14	75.8	70.3	55.0	91.0
15	90.0	72.0	63.3	82.5
16	45.0	68.0	72.5	75.0
17	75.0	55.0	60.0	70.5
18	100.0	80.3	60.5	83.5
19	85.0	63.0	62.5	100.0
20	89.0	70.0	65.0	70.0
21	95.0	80.0	89.0	85.0
22	100.0	60.0	70.0	55.0
23	82.5	7.5	19.5	10.0
24	100.0	30.0	41.0	41.0
25	75.0	65.0	50.5	70.0
26	120.0	88.0	65.0	85.0
27	93.0	65.5	51.5	60.0
28	115.0	70.0	50.0	75.0
29	88.5	70.3	69.0	65.0
30	70.0	61.0	55.0	70.0

We reproduce the graphs for these four experiments below

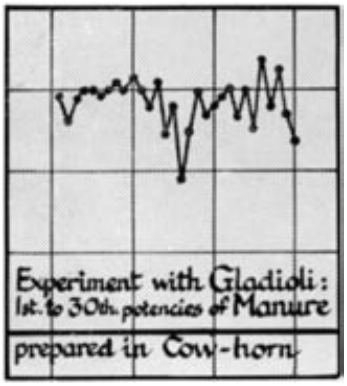


Fig. 178 E.1 Manure prepared in cow-horn

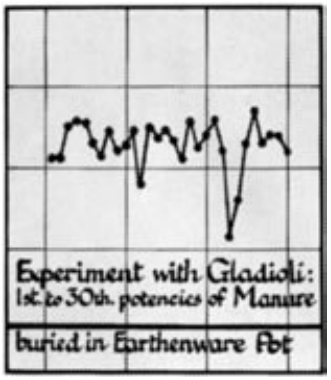


Fig. 179 E.2 Manure buried in earthenware pot

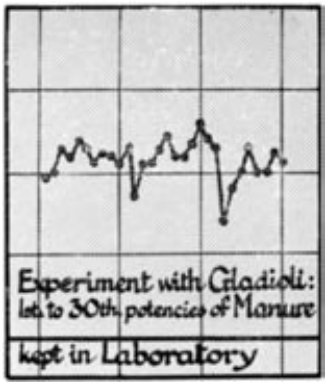


Fig. 180 E.3 Manure kept in laboratory

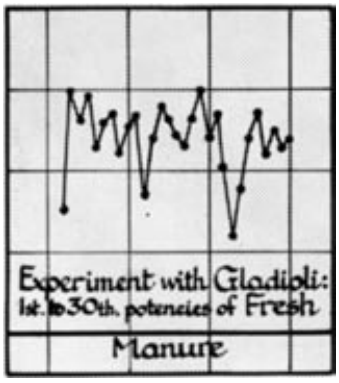


Fig. 181 E 4 Fresh cow manure

It is interesting to compare these figures. The 1st potency in E.1 shows better growth compared with E.2, E.3, E.4. Of course all the four different manures have undergone the same treatment: the same quantity of manure had been stirred into a thick paste with lukewarm rainwater, then into a thin paste, then stirred into a bucketful of lukewarm rainwater, and from this dilution we started to potentize. We find that the fresh manure does not influence the plants favourably and has to be further diluted. Only when the manure has been buried during winter in the soil, surrounded by the cow-horn may we use it in this concentration with benefit to the plant life. We must say, that the fresh manure is **not digested enough** to enter immediately into the plant organism. **It is still too much impregnated with animal forces.** In keeping the excretion of the cow enclosed in the cow's horn, we lead the digestion one step farther. We get then, an immensely powerful, vitalizing manure. "Fresh manure" cannot be taken in by plants, it has to be transformed into humus, it must reach a certain stage of decay. In this lies the great art of making a really good manure or compost heap. We will deal with this problem in another chapter.

The figures for the 1st potency prove that the older manure, which has been kept in the laboratory from October to March is better than the fresh one, and the one buried in the soil in an earthenware pot is still better. But none of them is so valuable as the cow-horn preparation.

The 2nd potency means a drop for the cow-horn manure, and an enormous rise for the fresh manure, whereas only slight changes take place in the other two preparations.

Then we notice a slow climbing up in the cow-horn preparation until it reaches the 10th potency. From this point the graph indicates the opposite movement until the minimum is reached at the 16th potency. Again the graph rises and reaches the maximum with 120 cm. at the 26th potency.

The fresh manure experiment, E.4, has its maximum with the 2nd potency, then climbs down to the minimum at the 12th potency. The same point is marked in E.3 and E.2.

E.4 reaches the maximum with only 100 cm. again at the 19th -potency, E.3 is similar (only at a lower level) and reaches the maximum at the 20th potency. E.2 marks the 21st potency, but reaches the maximum really at the 26th potency with 88 cm.

E.2, E.3 and E.4 have a second minimum at the 23rd potency.

Summarizing the result we may say: **the experiments indicate clearly a similarity between those experiments which have not been kept in the cow-horn; and obviously the better results are produced by the preparation which has been made according to Dr. Steiner's suggestion.**

(6.) Tests with our method of Capillary Dynamolysis

We refer to Part II, Chapter VII explaining this method. It is a very good and quick test to find differences in the inner qualities of substances. We compare E.I with E.4: the fresh cow manure and the cow-horn preparations. Equal quantities of the liquid rise in the filter-paper and afterwards the metal salt solutions are added. It is not possible to include more pictures, so we choose from all our material two which we think, to a certain extent, convey the differences between these two preparations.

We must try to understand the language of these pictures produced by Nature. It is a science which has to be learnt through hard work, but it is a Science, as accurate as we can wish for. The fresh cow manure and the prepared one are not different to look at on the filter paper. After adding gold chloride the differences become visible. The fresh cow manure changes with the gold chloride to rather dull, dark-looking shades of brownish purple. We are very sorry that we are unable to have the original colours reproduced. The dark shades in the photograph represent the brownish purple coloration; the lighter one pale purple and some yellow. The picture is full of life, but a chaotic life, a rather coarse force.

Figure 165 the prepared manure scarcely needs an explanation. Even the black and white photograph reveals the brilliancy m the colours. The lower part of the picture, which is unshaped in the fresh cow manure, is in the prepared one worked through with delicate, many coloured forms, bright purple, bluish-purple, yellow, golden-yellow and greenish-yellow. Who cannot see, in the upper part, a strong formative force shaping and moulding? Life is expanding, streaming and radiating in the prepared manure, the fresh manure contains all the forces, but still bound, chaotic, and concentrated in themselves; they cannot radiate into the surroundings.

The study of Capillary Dynamolysis tells us, that the prepared cow manure is a preparation filled with strong, radiating vital forces.

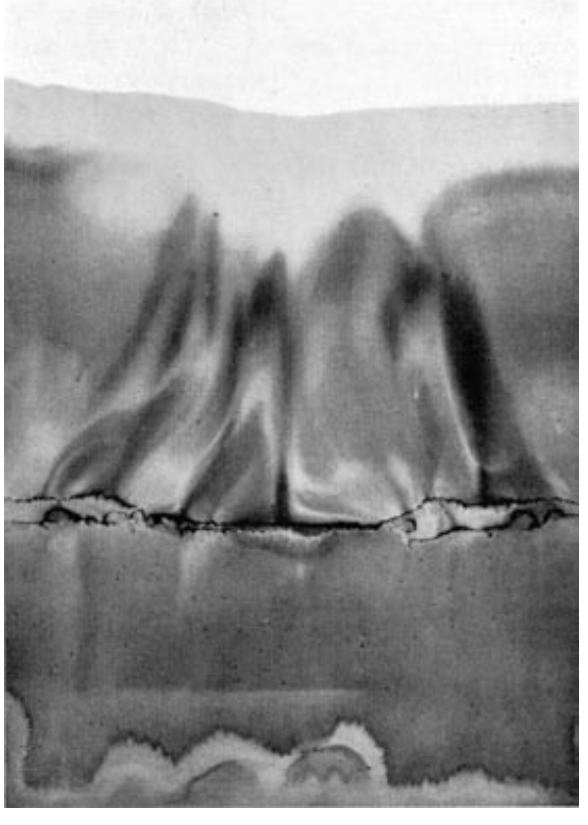


Fig. 182 Fresh cow manure and 1% of gold chloride

Fig. 183 Cow manure buried in cow-horn between October 1931 and March 1932 and 1% of gold chloride

Chapter II.
SUGGESTIONS FOB BUILDING UP A VALUABLE MANURE OR COMPOST HEAP.

The foremost task of manure is to bring life back into the soil. If this is so, it is hard to understand the propaganda for artificial fertilizers. We can never expect mineral salts to bring life back into the soil. We want the plants to take those different salts as food for themselves immediately. Today we **feed the plants and neglect the soil**. The soil becomes more and more mineralized, and the plants are losing their appetite for the salts.

Those with a materialistic point of view, will support the opinion, that the effectiveness of cow manure (or any other organic manure) consists only in its content of mineral salts. So it is no wonder that many think it possible to substitute artificial fertilizers for organic manure.

Other scientists think that the micro-organisms in the soil, the bacteria, those millions and billions of micro-organisms, are responsible for the value of organic manure. With this point of view one can understand the methods of implanting bacteria into manure heaps, or of injecting bacteria into the soil. Of course a good organic manure contains a rich world of micro-organisms, but we mistake the effect for the cause. Because the manure is full of life – the bacteria thrive in it. But we can never make a manure heap better with the help of micro-organisms, if it is not good in itself.

We find that there are different methods of trying to enrich the life of organic manure. But we shall never be able to do this, if we do not really understand **life, nature as a whole, the interplay of earth and the whole cosmos.**

Rudolf Steiner suggests for the enlivening of a manure – or compost – heap, the addition of different plants, which must be prepared in a special way, and are then added in small amounts. These plants are:

Oak bark (Quercus robur).
Dandelion (Taraxacum).
Camomile (Matricaria chamomilla).
Yarrow (Millefoil-Achillea millefolia).
Stinging Nettle (Urtica dioica).
Valerian (Valeriana officinalis).

Chapter III.
The Oak Bark Preparation

(1.) Introduction.
(2.) Experiments with wheat growing under the influence of:
  (a) Oak bark buried during winter in earthenware pot;
  (b) Oak bark buried during winter in the skull of a sheep.
(3.) Tests with Capillary Dynamolysis:
  (1.) Unprepared oak bark with iron sulphate.
  (2.) Unprepared oak bark with quicksilver chloride.
  (3.) Unprepared oak bark with gold chloride.
  (4.) Prepared oak bark with iron sulphate. 'K
  (5.) Prepared oak bark with quicksilver chloride.
  (6.) Prepared oak bark with gold chloride.
  (7.) Oak bark prepared in skull of sheep, experiments carried out in 1929-30, 1930-1, 1932-3.
  (8.) Oak bark prepared in skull of ox, 1931-2 and 1932-3.
  (9.) Oak bark prepared in skull of a cow, 1935-6.
  (10.) Oak bark prepared in skull of a horse.

(1.) Introduction

Oak bark is a general remedy for plant diseases. That is how Rudolf Steiner puts it briefly. Many of the so-called plant diseases can be cured through a reasonable manuring.

We must add calcium to the manure. But here again Rudolf Steiner's principle for agriculture is: not to add the substances we need in a mineralized form. It is far better to find the calcium in a living process. If a plant contains calcium in its organism, then the calcium is included in the life process and is different from the solid mineral. It would not help the plant to dig calcium into the soil, because the plant could not take it in this condition immediately from the soil. But calcium which is already included in the living organism of a plant, can be transferred to another plant organism without difficulty. Therefore Rudolf Steiner suggests making a preparation from the oak bark which is exceedingly rich in calcium. The chemical analysis of the ash of the bark proves that the calcium amounts to 78% and in old trees even more calcium is found. The oak tree has large quantities of calcium in the bark, and it is also found in the wood to a lesser degree.

The bark is used as a remedy for different human diseases, especially for spitting blood, and bleeding at the mouth; it prevents vomiting. It is a popular remedy for gastric ulcer and gastric bleeding, intestinal bleeding (blood-vomiting), diarrhoea, haemorrhoids, and so on.

The bark is a brownish silver-grey; smooth; shiny outside; and inside is reddish-brown. The fresh bark smells of tannic acid, is slightly bitter to taste, and is astringent. There is a fairly large amount of tannic acid in the acorns, bark and wood (about 10 to 13% in the ash and we find an interesting process of phosphoric acid). It has been stated, that the content of phosphoric acid varies during the course of the year, as well as the content of calcium. In summer there is a larger amount of phosphoric acid (about 20%) and a smaller amount of calcium in the ash of the wood (19%). In autumn the phosphoric acid decreases to about 10 to 12% and the calcium

rises to about 25%. The content of tannic acid does not vary so much during the whole life of an oak tree.

Dr. Steiner's suggestion is to take fresh oak bark of not too old a tree, and to break it up in small pieces. Then we must take the skull of any domestic animal and fill it with the oak bark. We close the opening of the skull if possible, with some bone of the animal;' and bury this preparation during winter-time not too deeply in the soil. But we should choose a situation to which water has access. Much water should stream over the place. The skull could even be placed in a barrel with decaying plant substance at the bottom, and be buried in this plant substance. Rainwater has free access to the barrel and should also be allowed to flow away (for instance, a leaking barrel could be used). In spring we take the oak bark from the skull just in the right condition for the manure heap, with an highly activated calcium content.

(2.) Experiments with the Oak Bark Preparation

We tried the skulls of many domestic animals: cow, ox, calf, horse, pig, sheep. We also had the opportunity of comparing many preparations made by farmers and gardeners who were experimenting.

We found that it is essential to use the skull in a quite fresh and undamaged condition. The head should never be split in halves. Never use a saw to open the skull and thus have easy access. If we do this, then we spoil the whole process which we intend to produce. We must understand that during lifetime the skull protects a very sensitive organ: the brain. We have to replace the brain of the animal with the oak bark as quickly as possible without damaging the surrounding. If we really want to get the best result, we must take special care that the organs of the animal we use are intact, and that we retain as much of the life-forces as possible.

There is a way of substituting the oak bark for the brain without damaging the skull. Of course it takes more time, but it is worth while. We pull the brain out with a small wooden stick through the natural opening of the head (occipital foramen). The last particles may be washed away with a few drops of rainwater, but it is better to try to get the brain out without using water. Then the oak bark must at once be squeezed in, using a spoon if the oak bark is very pulverized; or we can use our fingers to help to press it tightly into the skull. It is quite possible to fill the whole space tightly with oak bark. Usually we can take off a piece of the jaw bone and fit it in the occipital foramen. This preparation has now to be buried.

We made many experiments, either having the skull buried in an open rainwater barrel, or in the soil, with running water over it, and prefer the latter method. We need not bury it very deeply; we cover the skull slightly with peat moss and then with soil. In spring, when we take the preparation out of the soil, we find the oak bark very much changed. The colour is nearly black, its **crumbly structure looks and smells like good fresh soil**. It is a beautiful preparation full of life. **Many micro-organisms** are in it. No one would believe that it is oak bark which fills the skull.

During the last twenty years we have seen many similar preparations and we know that many mistakes are being made. Very often the oak bark preparation has not undergone a real digestive process, then it looks still brown and lifeless and is much more like the ordinary oak bark we take from the tree.

Again the question arises: Must we really take the skull of an animal? Is it not sufficient to bury oak bark alone, or to have it in any other kind of vessel? Therefore we made a similar experiment

to the one already described for the cow manure in the cow-horn. We made one preparation according to Dr. Steiner's suggestion, and another by placing the fresh oak bark of the same tree in an earthenware pot. We covered it tightly with a fitting lid and buried it at the same time in good soil. In spring when we opened the skull and the black humus-like substance came out, smelling like good, living soil, the earthenware pot contained the same reddish-brown oak bark that was put in it in October. Nothing had changed. That was an entirely convincing experience. The change in the oak bark was remarkable in the first experiment, while nothing happened to the other preparation.

Nevertheless we made our usual experiment to find the homoeopathic influence of the two preparations on plant growth, taking one gram of each, adding 10 c.c. of lukewarm rainwater, and placed the two bottles in the sun. The oak bark which had been buried in the skull, only slightly coloured the water; whereas the oak bark which had been buried in the earthenware pot made the water clear brown. The oak bark preparation in the skull had lost nearly all its content of tannic acid, the other preparation still contained tannic acid. We proceeded after a few days to potentize the two liquids and later on obtained the following result:

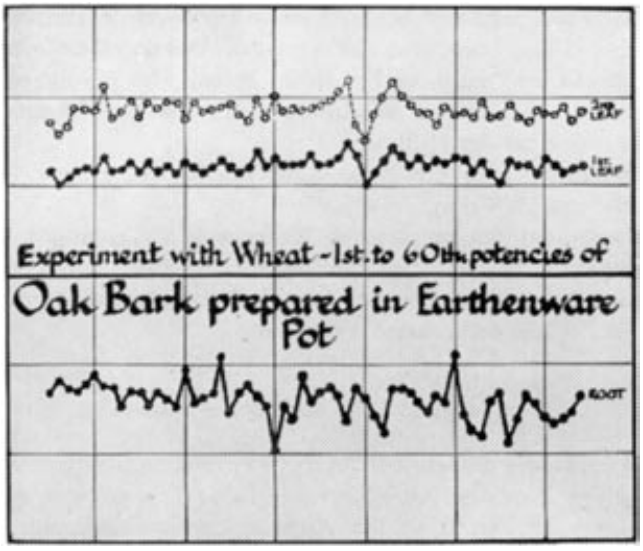


Fig. 184 Wheat plants grown under the influence of 1st-60th potencies of oak bark buried in earthenware pot

The first maximum for the first and second leaf happens at the 7th potency, the second at the 33rd, the third at the 38th potency There is only one minimum for both leaves at the 35th potency.

The roots have two minima at the 19th and at the 45th potencies, and two maxima at the 25th and 56th potencies.

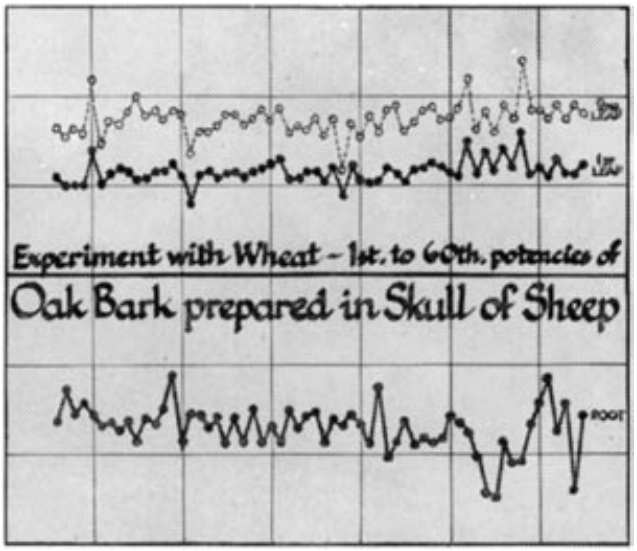


Fig. 185 Wheat plants grown under the influence of 1st-60th potencies of oak bark buried in the skull of a sheep

We notice a great difference between these two graphs. The prepared oak bark is more harmonized. The first maximum is at the 5th, the second at the 47th, and the third at the 53rd potency. There are two minima at the 16th and 33rd potencies.

The roots have three minima, at the 14th, 37th and 56th potencies, and two maxima at the 50th and 59th potencies.

The root growth is much better with the prepared oak bark, especially with the last twenty potencies.

The weight of the dried plants is in favour of the prepared oak bark.

(3.) Tests with Capillary Dynamolysis

If the extract of oak bark rises in filter paper, it produces only an insignificant, wavy border line of light-brown colour. The prepared oak bark is even more insignificant, because it is more lacking in colour. The addition of silver nitrate produces a quick chemical reaction. The pictures form themselves rather rapidly and consist of intensive reddish-brown colours. Unfortunately these pictures darken also very quickly and then they are completely spoilt.

The addition of iron sulphate changes the pale yellow paper into a strong moss-green and characteristic formations appear.

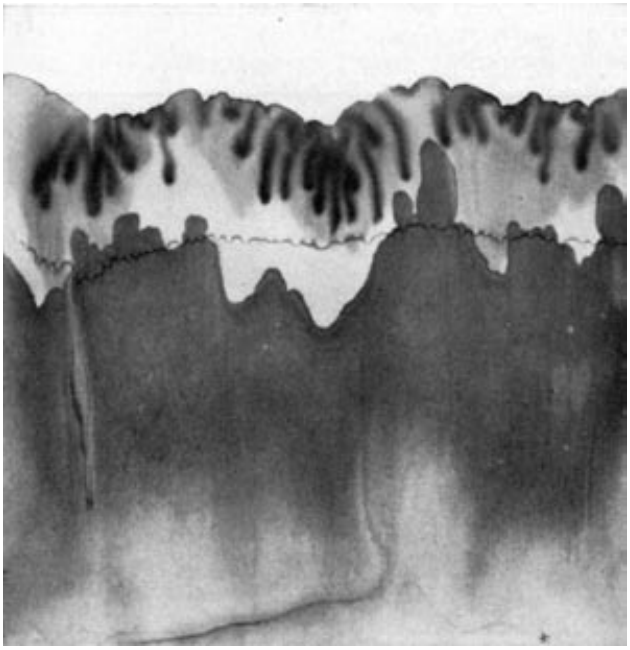


Fig. 186 Oak bark unprepared, followed by 1% iron sulphate

Two different groups of formation are visible on this test. The one going from the bottom of the picture towards the top, the other running from the top down to the first border line formed by the oak bark solution alone.

Plate III

Oak bark unprepared followed by 1% gold chloride

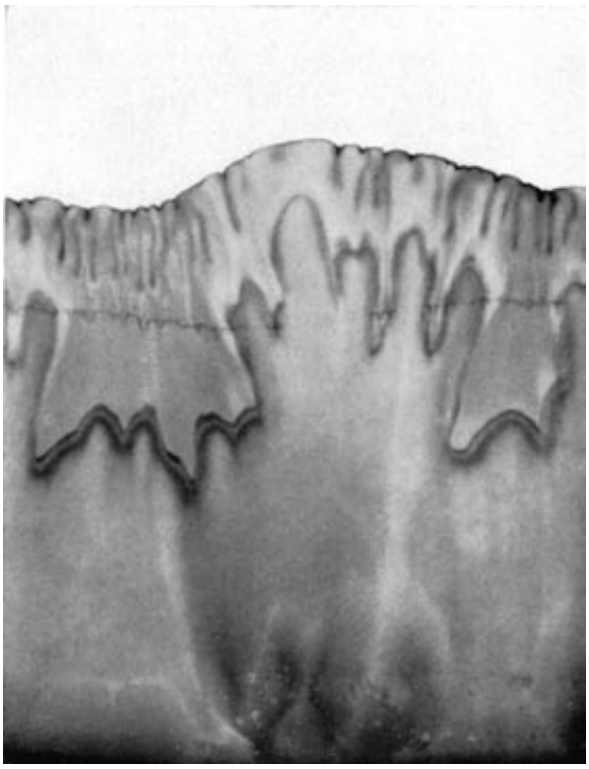


Fig. 187 Oak bark unprepared, followed by 1 % of quicksilver chloride

The addition of quicksilver chloride also produces a change in the coloration, but it is less strong than with iron sulphate. Across the picture we see the thin border line which had been formed at first by the oak bark alone, then the two streams of forms from the top to the border line, much more delicate than that produced by the iron sulphate, and from the bottom to the top, strong rounded forms -more powerful than in the iron experiment. They are greenish-yellow, framed by clear brown. The original looked beautiful.

But the most beautiful experiment was obtained using gold chloride.

In some ways we are reminded of the forms of quicksilver chloride – only the colours are different. The huge wavy lines are bluish-green, the top of the picture is clear yellow, below the wavy formations, light moss-green. From the bottom to the top, a dark purple, pointed, flame-like form radiates; this has light purple shades inside, which slowly change to orange and some shades of brown.

Less interesting are the experiments with copper sulphate, tin chloride and lead nitrate.

We repeated these experiments with the prepared oak bark and obtained the following results:

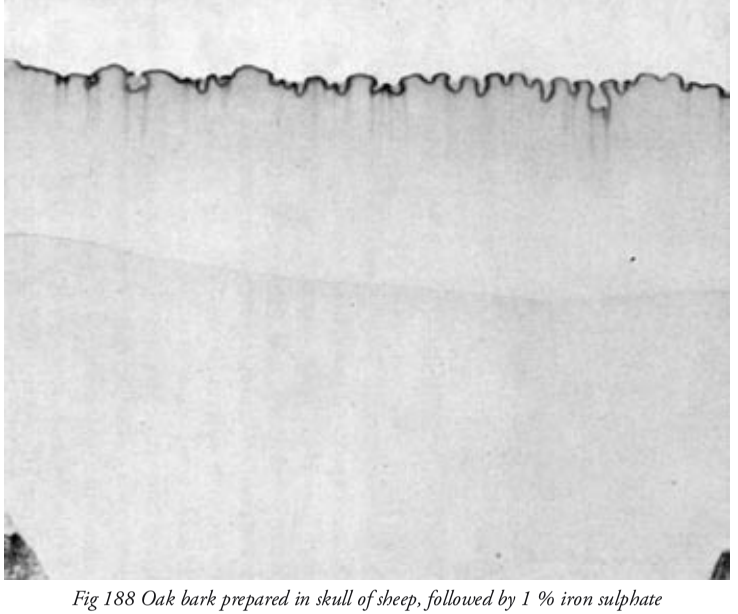


Fig 188 Oak bark prepared in skull of sheep, followed by 1 % iron sulphate

The iron sulphate does not react, there is no change in the colour, no characteristic forms appear

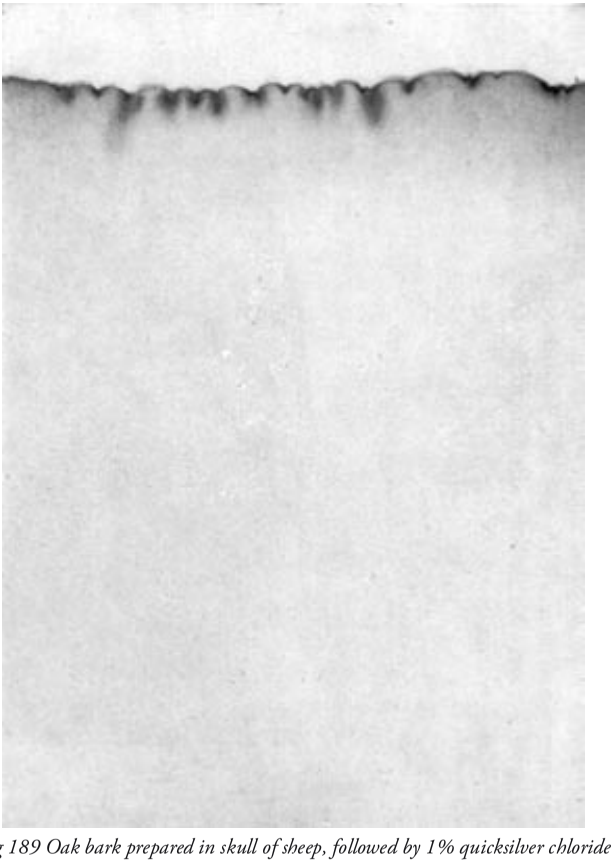


Fig 189 Oak bark prepared in skull of sheep, followed by 1% quicksilver chloride

The quicksilver streams through the preformed oak bark picture and nothing happens. No colour appears and no forms, only the rising limit is much higher than in the picture with the unprepared oak bark. Since the experiments are carried out at the same time, the increased rising limit cannot be attributed to external differences, as for instance, an increased humidity in the air, or changed temperature.

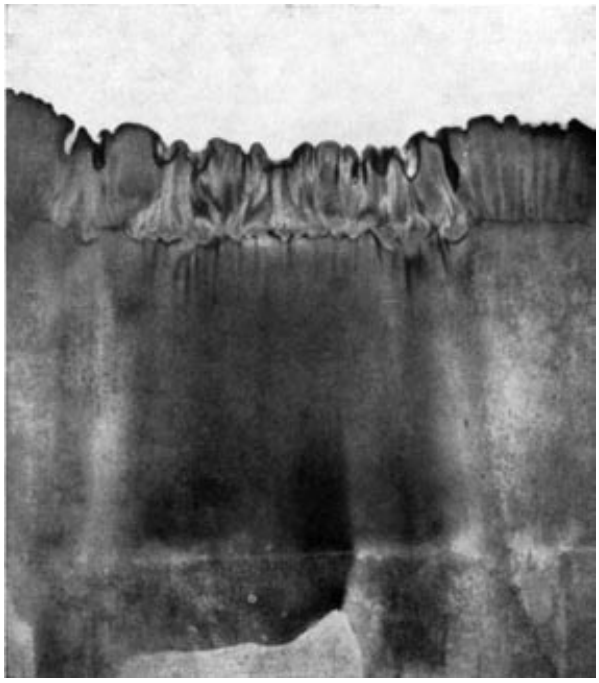


Fig. 190 Oak bark prepared in the skull of a sheep, followed by 1 % gold chloride

The colours are dark purple, the picture looks dull, and is spotted. We see in the lower parts of the picture that a certain effort has been made to produce some formations, but they are covered with a dark veil.

The experiments with silver nitrate, copper sulphate, tin chloride and lead nitrate were quite insignificant.

The fresh oak bark, and oak bark which has been buried in an earthenware pot, have in themselves a strong formative force, which can be revealed with the different metal salt solutions. This specific formative force has disappeared after the preparation has been affected in the skull of an animal. The bark is changed to a black substance like humus, which is full of life, but has lost its formative force.

Year after year we experienced the same result, in the skull of a cow, or pig, or sheep, or horse. There are slight differences according to the different animals, which are only discernible after comparing results for some years. For instance, we may look at the experiments with oak bark in a sheep skull:

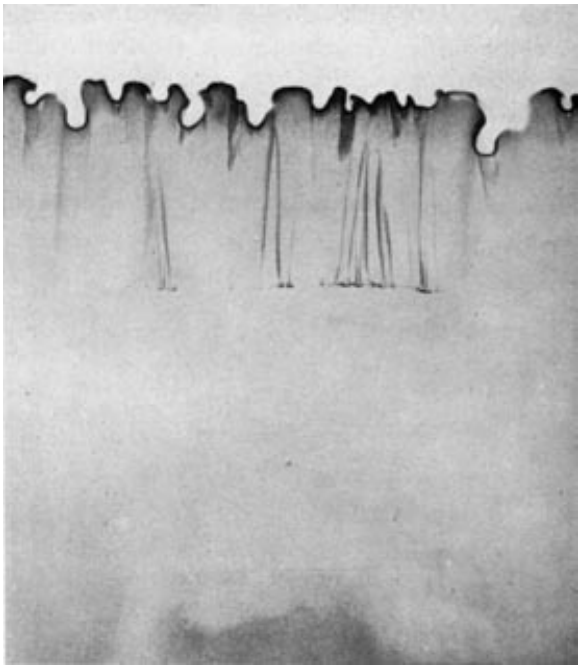


Fig. 191 Experiment with oak bark followed by 1 % silver nitrate 1929-30

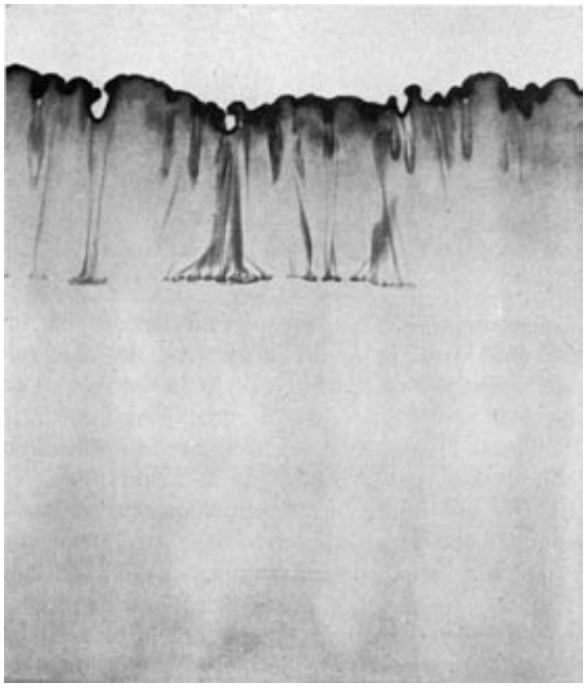


Fig. 192 Experiment with oak bark followed by 1% silver nitrate 1930-1

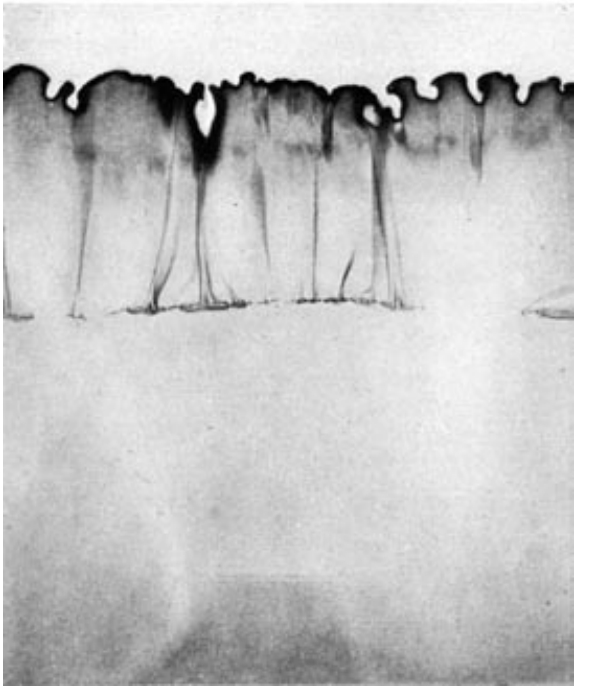
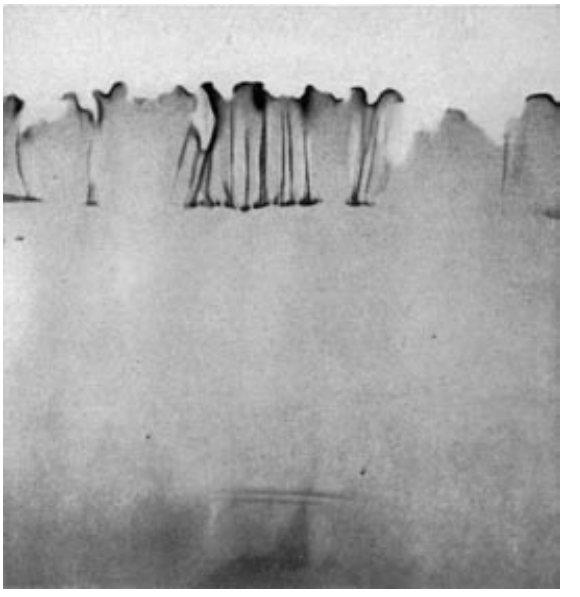


Fig. 193 Experiment with oak bark followed by 1 % silver nitrate 1932-3

The similarity is quite astonishing. Year after year we get the same effects.

If we make the preparation of oak bark in the skull of an ox and repeat this experiment, we get the following result:

Fig. 194 Oak bark prepared in the skull of an ox, 1931-2 followed by 1% silver nitrate



There is again a great similarity between Figs. 194 and 195, and there are certain differences between them and the sheep skull preparation.

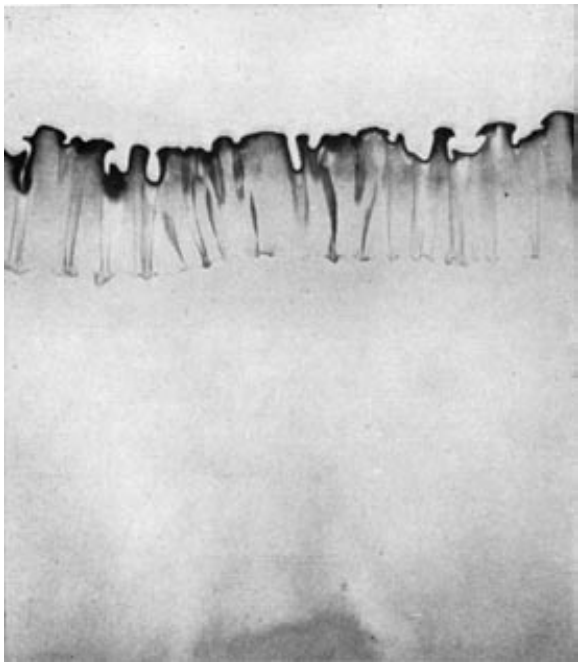


Fig. 195 Oak bark prepared in the skull of an ox, 1934-5 followed by 1 % silver nitrate

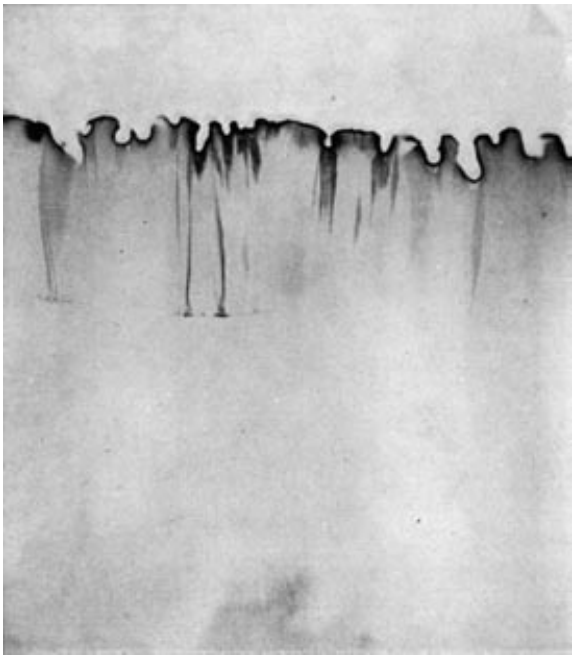


Fig. 196 Oak bark prepared in the skull of a cow followed by 1% silver nitrate

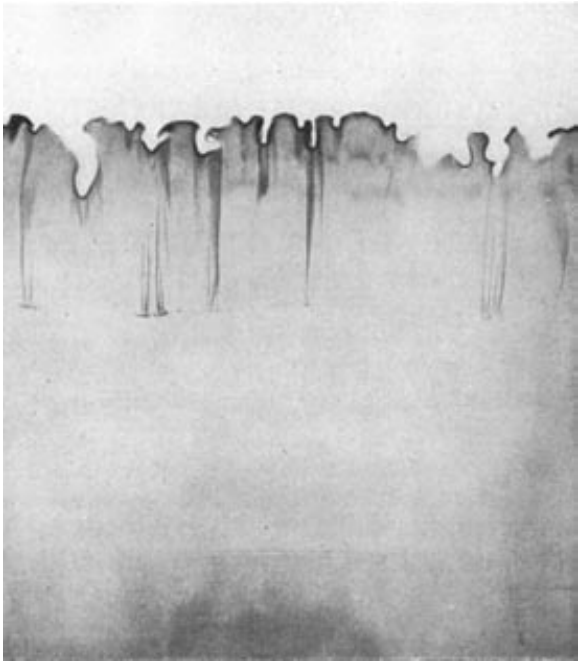


Fig. 197 Oak bark prepared in the skull of a horse followed by I % silver nitrate

The oak bark is transformed in all the different skulls of domestic animals in a similar way.

We like the preparation in the horse skull the least, as it has an unpleasant smell. All the others are good.

Chapter IV. THE DANDELION PREPARATION.

(1.) Introduction.
(2.) Experiments with Wheat.
  (1.) Comparative experiments with wheat plants grown under the influence of 1st-60th potencies of unprepared Dandelion.
  (2.) The same experiment carried out at the same time with prepared Dandelion.
(3.) Tests with Capillary Dynamolysis:
  Unprepared Dandelion followed by 1 % gold chloride;
  Prepared Dandelion followed by 1 % gold chloride.

(1.) Introduction

Rudolf Steiner describes the dandelion as a plant gifted with the capacity of regulating the relation between silicic acid and potassium in the plant organism. If we prepare dandelion in a certain way, and add this preparation in a minute quantity to the manure – or compost heap – then this manure is able to achieve this regulation in plant life.

The preparation suggested for dandelion seems strange. We collect the flowers, let them slightly fade, or dry them (they must not go to seed), press them tightly together, and fill the mesentery of an ox with them. During the winter the mesentery is buried in the soil, so that it is exposed to the strong forces which stream through the soil at this time of the year, and in spring it is ready to be used in the compost heap. Again we need only a very small amount – 1 or 2 grams for a medium-sized heap (2-3 cubic yards).

The dandelion is a well-known plant. It has long and deeply serrated leaves which yield a bitter milky juice if we break them. The roots grow downwards deeply into the earth. The large golden yellow flower turns later, when the seeds ripen, into a round ball with long reddish seeds underneath. We find it frequently in meadows and pasture grounds. Culpeper tells us that "this plant is under the government of Jupiter, that it is of an opening and cleansing quality, and therefore very effectual for the obstructions of the liver, gall and spleen, and the diseases which derive from them, as the jaundice and hypochondriac. It opens the passages of the urine both in young and old."

It has been found by chemical analysis that the content of bitter substances varies greatly during the year. The greatest amount of bitter substances is in the leaves in spring, and in the roots between July and August. The most important substance in the root is **Inulin**, the amount of which varies from 1.7% to 24% between spring and autumn; whereas in spring the roots have a rather large amount of sugar and laevulin, about 17% of each. Therefore if extracts of dandelion are made they will vary greatly according to the time of year.

The ash contains a fairly large amount of silica and calcium.

(2.) Experiments with Dandelion prepared according to Dr. Steiner's suggestions

Again the question arises: Is there really any difference between ordinary dandelion and the dandelion which has been buried in the soil enclosed in the mesentery of an ox? For many years we studied all these preparations and can truthfully answer: "Yes, there is a great difference if the plants have been treated in these strange ways." Because we have to add all the preparations in a

homoeopathic quantity to the manure heaps, we always start the experiments with the test: **how do smallest entities of the preparation influence plant growth?**

First, we have to make the preparation very carefully. The dandelion is collected, immediately put into the mesentery, and kept until the beginning of October in a cool, dry place covered with peat moss. If we do not get the mesentery in time, the dandelion must undergo a careful drying process. The flowers have to be spread out on filter paper (or any other clean paper) in a warm, dry room. Some will change into seeds, but if we take sufficient care, the rest will be all right.

Never keep the flowers in too thick a layer, or they will become mouldy.

Collect only beautiful specimens, the plants ace sufficiently numerous everywhere. We can put quite a large amount of dandelion in one mesentery.

The mesentery must be perfect. Do not use damaged parts with little holes. The surplus fat which surrounds the skin can be cut off and used in the kitchen, we need only the skin. The skin is tender, so we must be careful not to break it. It must be well wrapped round the flowers and then we wind a string round it, or fasten it any other way we find suitable. Dr. Steiner suggested that the plants should be sewn into the mesentery – but it is rather difficult to do this without breaking the skin. It is a nice little package when we have finished, and we see the flowers through the transparent skin.

Again we bury it in good soil about three feet deep and cover it carefully with soil, marking the spot, so that we may find it again in spring.

At about Easter the preparation is finished. The dandelion looks changed, it smells pleasantly, and contains a certain moisture.

For the experiment we take 1 gram of this prepared dandelion and add 10 c.c. of lukewarm rainwater. We keep the bottle well stoppered for two to three days in the sun.

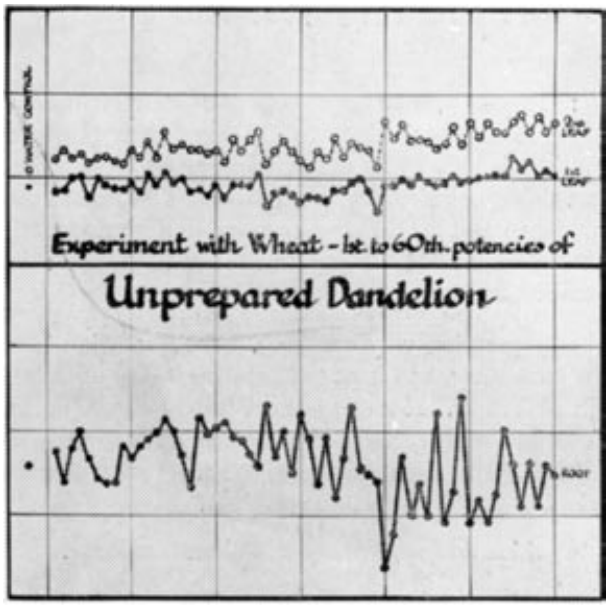


Fig. 198 Wheat plants grown under the influence of 1st-60th potencies of unprepared dandelion extract

For the second experiment we take the same amount of 1 gram of dried dandelion we had put aside when we filled the mesentery. After a short time the liquid becomes a light brown colour over the prepared dandelion; the unprepared becomes only slightly yellow. After two to three days we begin to potentize these two extracts and make the usual experiment with wheat.

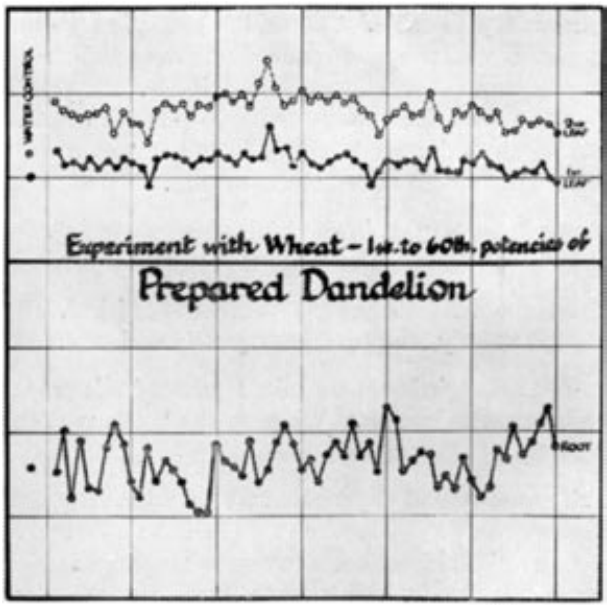


Fig. 199 Wheat plants grown under the influence of 1st-60th potencies of prepared dandelion extract

This graph is not easy to read. We find two minima for the leaves, the 26th and 39th potencies. One maximum is at the 40th potency. As a whole the tendency is an increased growth, especially in the last 20 potencies.

The growth of the roots is very unstable. The first minimum is at the 26th potency, the second at the 36th, the third at the 49th potency. There is one strong maximum at the 40th potency. Also the roots show a definite advance from the 40th to the 60th potencies.

The difference between these two graphs is enormous. The prepared dandelion has a perfectly harmonious graph. (Each point in the graph stands for the average growth of 30 seeds which are carefully selected, so that the individual differences are very small.)

First and second leaves have the first minimum at the 12th potency, the second minimum at the 38th and 39th respectively. Almost in the middle of the two minima, forming a symmetrical curve to both sides, lies the maximum at the 26th potency.

The roots on the whole are also unstable in their movement. The first minimum occurs at the 40th, and the second at the 59th potency. The maximum is at the 19th potency.

In contradistinction to the unprepared dandelion, the first 20 potencies grow better (unprepared had the last 20 potencies advanced). The preparation has somehow harmonized the forces of the plant.

If we compare these two experiments with their respective weight, we are still more amazed at the difference.

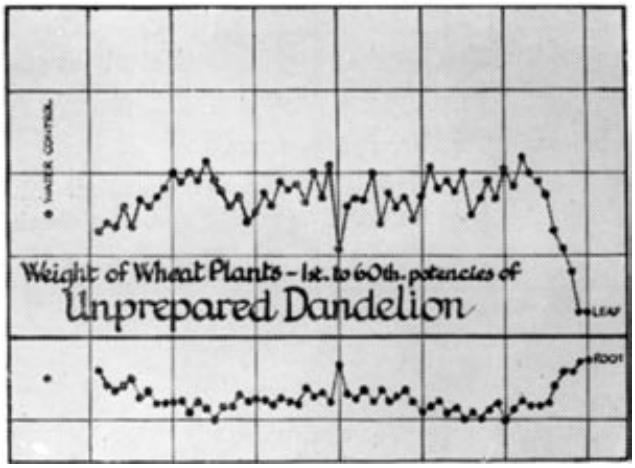


Fig. 200 Weight of the wheat plants grown under the influence of 1st-60th potencies of unprepared dandelion

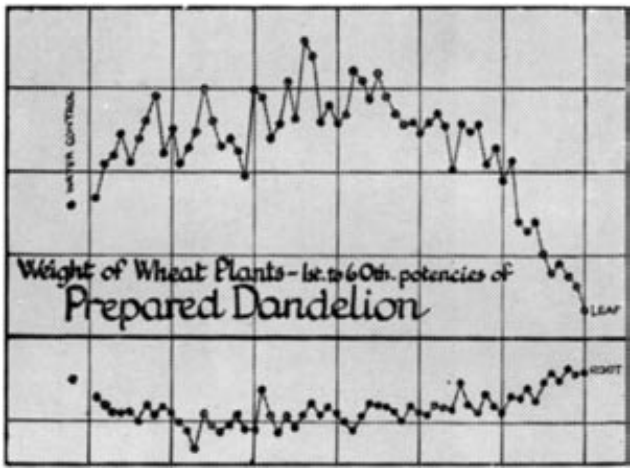


Fig. 201 Weight of the wheat plants grown under the influence of 1st-60th potencies of prepared dandelion

The unprepared dandelion has a graph of two periods. The minimum at the 30th potency divides it. The first period has the maximum weight at the 14th potency and the minimum at the 19th. The second period is less clear as far as the minima are concerned. There are three equally strong minima, the 35th, 39th and 46th potencies, and the fourth decisive at the 60th. The maximum is at the 52nd potency, followed by a steady downward movement.

The graph for the roots is beautifully symmetrical in the first period, with the maximum at the 15th potency. The second period has the maximum at the 50th, and the minimum at the 60th potency.

The **prepared** dandelion has only **one** period, with the maximum at the 26th potency and two minima at the 19th and 44th potencies for the leaves. For the roots the maximum is at the 13th potency, two minima are at the 21st and 45th potencies.

On the whole, the **prepared dandelion has increased the weight of the plants considerably** in comparison with the unprepared dandelion.

(3.) Tests with Capillary Dynamolysis

It is not easy to get a really characteristic picture of the dandelion. Much depends on the time when the plants are collected. The best test we ever obtained is shown in the following picture:

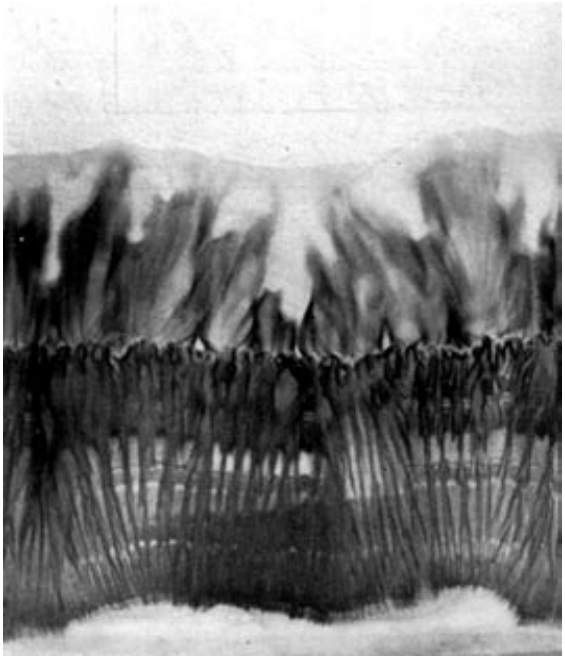


Fig. 202 Extract of dandelion unprepared, followed by 1 % gold chloride

The dandelion juice itself forms an insignificant yellow border line at about the middle of the picture. The gold chloride develops out of the void these beautiful characteristic forms. An intimate study will convince the reader that much of the characteristic formation of the leaves is hidden m the lower part of the picture. The colours were very bright purple, bluish-purple and yellow, with green on the top. Iron and tin salts gave good results, but the best was gold chloride.

It is a great pity that we cannot reproduce the original colours. The picture is very clear – it is difficult to describe – but the most truthful description would be to say, it contains more **light**, than the other experiment. **Less strong formative forces, but a stronger, clear, light-power.** There are no dark purple shades, everything is light blue-purple, yellow, and greenish-yellow. The only dark purple line is in the middle, the rising limit of the dandelion juice.

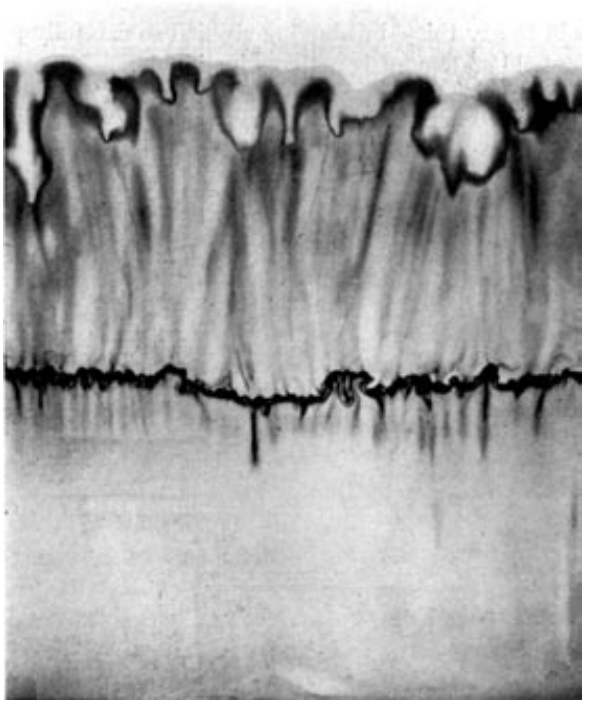


Fig. 203 Extract of prepared dandelion, followed by 1% gold chloride

If we compare the rising limit of both juices, then we must say they are nearly identical. It would not be possible to discriminate between the two experiments before the metal salt has passed through. Only the gold can reveal the difference between the two extracts. The unprepared has more formative forces, but they are mixed with darkness; the prepared dandelion has lost some of the characteristic formative forces, but has acquired an inner force of light.

We remind the reader of our chapter on **silica.** The specific quality of silica is to enhance the light-forces in the soil. Plants which grow under the influence of silica show similar phenomena to plants which get an excessive amount of light. We are convinced that the differences in the picture are due to the activating of the silica process in the dandelion extract.

It may be bold to say this – but having studied so carefully all these processes for many years – a bold statement is perhaps justifiable.

The gold can carry the prepared dandelion juice higher up than the unprepared. Of course those experiments have been carried out at the same time, in the same room, under perfectly identical conditions as far as light, heat and humidity of the air are concerned.

This preparation added to the manure heap is supposed to help the plants to find the right relationship between silica and potassium. The manure will enable the soil to take in the right amount of silica from the atmosphere and cosmic surroundings, and the plants which grow in such a soil will become sensitive to the presence of silica in their surroundings and will have the capacity to use it in the right way.

Chapter V.
THE CAMOMILE PREPARATION.

(1.) Introduction.
(2.) Experiments with Wheat.
    (1.) To study the homoeopathic effect of this preparation on wheat plants from the 1st to the 60th potencies.
    (2.) The same experiment carried out with unprepared camomile.
(3.) Tests with Capillary Dynamolysis: prepared camomile followed by 1% of gold chloride; unprepared camomile followed by 1% of gold chloride.

(1.) Introduction

Rudolf Steiner suggests **Camomile** (Matricaria chamomilla) for the regulation of the **calcium process.** Camomile has a homoeopathic content of sulphur which enables it to regulate the intake of calcium. If we prepare camomile flowers and add them to the manure, we enable the manure to assimilate so many life-forces that they can be transmitted to the soil for the benefit of the plants. The manure heap must not only have life, it must also be in such a condition, that it can be distributed in the soil. Rudolf Steiner suggests studying the influence of camomile on the human body. Milfoil acts on the kidneys, not so the camomile. This plant is more effective in the intestines. It is a very well-known remedy for "all pains and torments in the belly" (according to Culpeper's herbal the old Egyptians dedicated camomile to the Sun). "The bathing with a decoction of chamomile taketh away weariness, easeth the pains to what parts soever they be applied. It comfortes the sinews that be overstrained, mollifies swellings; it moderately comforteth all parts that have need of warmth, **digesteth** and **dissolveth** whatsoever has need thereof by a wonderful speedy property; it eases all the pains of the colic and stone and all torments of the belly." "It is profitable for all sorts of agues that come either from phlegm, or melancholy, or from inflammation of the bowels."

We can easily understand, that we must not put the camomile flowers into a bladder, as we do milfoil,* but in that organ which is more related to the whole camomile process: the intestines. We need the intestines of an ox for this purpose,

The camomile plant grows everywhere in the meadows, blooms from May to June and exhales a characteristic aroma. The name matricaria is derived from the Latin mater (mother) and indicates that the plant has been used to ease the pains of childbirth. Although this plant is known everywhere, people often do not discriminate between chamomilla matricaria, and other wild species; but for our preparation it is essential to use only the chamomilla officinalis, or matricaria.

How to make the preparation for the manure

We gather the beautiful white flowers in May or June (only the flower heads) and dry them carefully on paper, spread out in thin layers. The plant dries rather quickly and beautifully. Then we may keep it in paper bags or glass jars, well closed so that the etheric oils do not evaporate until autumn. At the beginning of October we try to obtain fresh intestines from the butcher, and

* See the chapter about the milfoil preparation.

again it is better not to wash them. They are not pleasant to handle, but after a time we overcome our distaste. First we wind some twine round the intestines to close the opening, then cut off a piece about 10 inches long and press the camomile in from this end. We make a well-shaped "sausage", and wind another thread round to shut the opening. After doing this for some time, we have the distinct feeling that we are doing a quite natural thing; the sausages look pleasant and smell nice, and somehow the plant and this organ seem to belong to each other. The ox could have eaten the camomile flowers in the meadows and have them quite naturally in its intestines. Only in that case they would have passed through the stomachs and would have undergone a part of the digestive process in the organism of the animal. **We need only that part of digestion which takes place in the intestines** and not the whole digestive process, where part of the plant-forces are absorbed by the animal organism for its own use, and only the remainder goes into the intestines to be excreted.

We bury these "sausages" during the winter in good soil and have the finished preparation in spring, ready for use in our manure heaps. It is good to choose a place for burying the camomile sausages where snow may cover the soil during winter and later on the sun can shine on the snow-crystals and melt them away. We need all the cosmic forces both below and above the soil for the perfection of this preparation, which later on helps to retain the **nitrogen** in the manure and to raise a healthy crop.

If we have taken sufficient care in making and burying the "sausages", we can dig them up in the spring unharmed; and again we need only a tiny amount of this prepared camomile for the manure heap: 1-2 grams for a medium-sized heap.

Experiments with prepared Camomile

Again, the first experiment is to discover the homoeopathic effect of this preparation. We take 1 gram of the prepared camomile, add 10 c.c. lukewarm rainwater, and place the bottle in the sun for a few days. The same is done with 1 gram of camomile flowers kept in a glass jar during October-March in the laboratory. We observe the different colour of both extracts. The camomile which has undergone the preparation in the intestines has a darker coloured Juice than the unprepared. From these extracts we make the potencies (up to the 60th) and then allow wheat to germinate and grow for a fortnight in these potencies.

It is a very clear, harmonious graph, which We can easily understand, The first maximum for the second leaf happens at the 9th potency, the second at the 46th. The first leaf does not indicate the maximum growth. The first minimum for the first leaf happens at the 25th, the second, at the 54th potency (52nd, 53rd and 54th). The second leaf has the first minimum at the 26th and the second at the 53rd potency, but also the 52nd and 54th potencies are very close to the minimum.

The roots indicate three minima: the first at the 19th, the second at the 33rd and the third at the 53rd potency. There is no maximum growth.

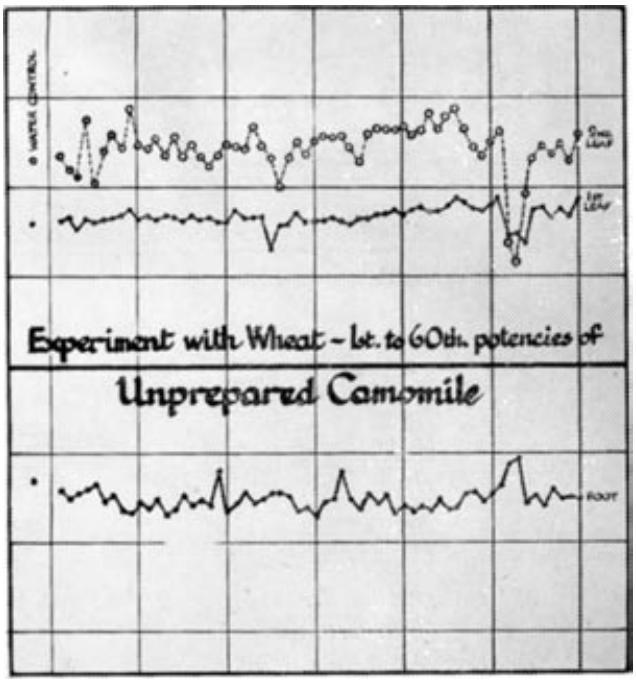


Fig. 204 Wheat plants grown under the influence of 1st-60th potencies of unprepared camomile

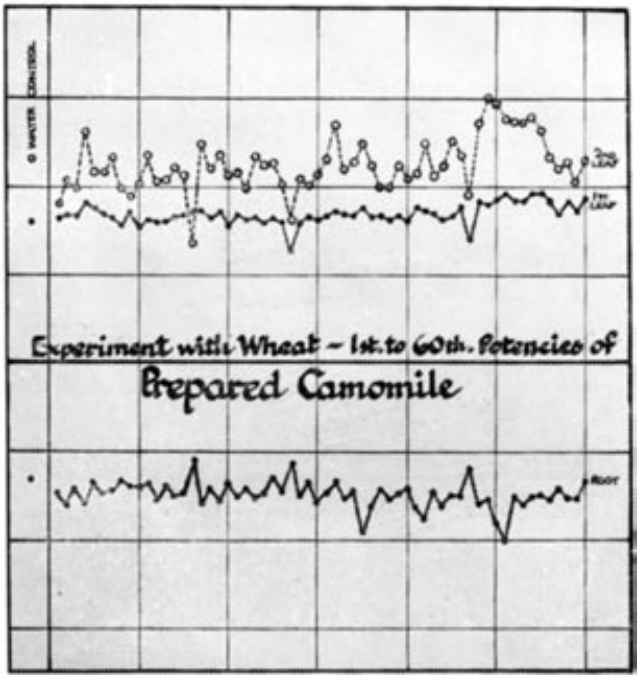


Fig. 205 Wheat plants grown under the influence of 1st-60th potencies of prepared camomile

At the first glance this graph seems similar to the previous one, but actually there are great differences.

The first maximum occurs earlier, at the 4th potency (for the second leaf), the second maximum is at the 32nd, and there is a third maximum at the 49th potency. Also here we see that the first leaf does not indicate the maximum growth, only the second, We have also three minima: the 16th, the 27th and the 47th potencies. Both leaves have the same minima.

The roots show three minima: the 16th, 27th and 47th potencies. They coincide with the minima of the leaves. We have also a maximum growth in the roots at the 35th and 51st potencies.

The more intimately we study these two graphs, the more differences we find. The preparation of the camomile has produced a greater harmonization of its forces. The unprepared camomile has discrepancies between the first and second leaf formation of the minima, also the root changes the position of the minima, whereas the prepared camomile is perfectly balanced. In the prepared camomile there is also an opposite movement in the final potencies. Where the one graph shows maximum growth, the other descends to its minimum. The unprepared does not produce maximum growth in the roots, the prepared does, and so on.

The comparison of **weight**, proved a considerable increase of weight in the prepared camomile.

(3.) Tests with Capillary Dynamolysis

For camomile we prefer the experiment with an addition of gold chloride to all the other metal salt combinations. The procedure is the usual one. We extract 1 gram of the prepared camomile with 10 c.c. lukewarm rainwater and keep it in the sun for a few days, then compare it with 1 gram of dried camomile flowers which have the same age, and have been kept in glass jars in the laboratory.

The extracts rise equally high in the filter paper and produce an insignificant slightly yellow border line. There is no difference to be seen between these two extracts. We add the various metal salt solutions and the differences become evident to every unprejudiced observer.

The unprepared camomile has a characteristic formation. Tiny flames emerge from the border line and rise to the top. The picture has beauty and clearness in the colours. There are no dark shades. It is a sulphuric process which expresses itself, but it is not a very strong one. The formation is full of life, but in a chaotic condition.

The prepared camomile has been quietened down, especially in regard to its "sulphuric process". A great harmonization of all the forces has taken place. The colours are still brighter and the specific formation arises here **from the borderlines downwards.** It is a specific plant structure.

In these two pictures we find the same process (of course, on another level), that we find in the two graphs. The graph, Fig. 204, is more unbalanced in its forces, the maxima and minima are struggling against each other, they cannot decide about the right place, whereas graph 205 is completely balanced and harmonized.

The preparation has been changed considerably during its stay in the intestines, while buried in the soil, and has acquired new faculties we miss in the unprepared camomile. We can understand that the prepared camomile exercises a harmonizing effect in the manure to which it is added.

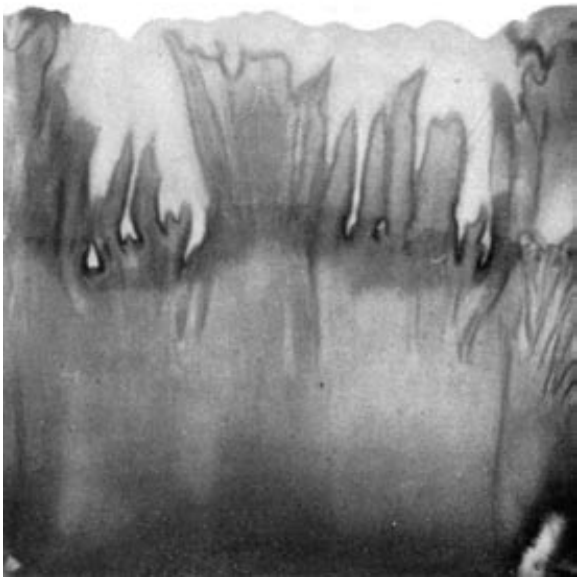


Fig. 206 Extract of the unprepared camomile followed by 1% gold chloride

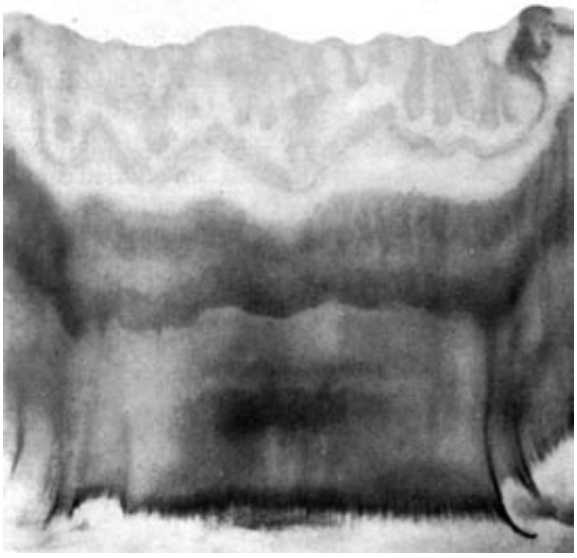


Fig. 207 Extract of camomile prepared according to Dr. Steiner's suggestions, followed by 1% gold chloride

Chapter VI.
THE MILFOIL PREPARATION.

(1.) Introduction.
(2.) Experiments:
- (1.) Test with Capillary Dynamolysis of the urine of a stag
- (2.) Test with Capillary Dynamolysis of the urine of a stag followed by 1 % silver nitrate
- (3.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% quicksilver chloride
- (4.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% copper sulphate
- (5.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% gold chloride
- (6.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% iron sulphate
- (7.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% tin chloride
- (8.) Test with Capillary Dynamolysis of the urine of a stag followed by 1% lead nitrate
- (9.) Reversed method: 1% silver nitrate followed by stag's urine.
- (10.) Similar experiment with another stag
- (11.) Similar experiment with another stag (12.) Similar experiment with diseased stag
- (13.) Test with Capillary Dynamolysis of the urine of a male fox.
- (14.) Test with Capillary Dynamolysis of the urine of a female fox.
- (15.) Experiment with wheat to study the homoeopathic effect of milfoil kept in the bladder of a pig
- (16.) The same experiment carried out with milfoil kept in the bladder of-a male fox
- (17.) The same experiment carried out with milfoil kept in the bladder of a stag
- (18.) The same experiment with unprepared milfoil.
- (19.) The same experiment carried out with one-year-old preparation of milfoil
- (20.) The same experiment carried out with an eight-year-old preparation of milfoil
- (21.) Weight of wheat plants grown under the influence of 1st-60th potencies of unprepared milfoil
- (22.) Same experiment with prepared milfoil (one-year-old preparation)
- (23.) Same experiment with prepared milfoil (eight-year-old preparation)
- (24.) Test with Capillary Dynamolysis of unprepared milfoil followed by 1 % gold chloride.
- (25.) Test with Capillary Dynamolysis of prepared milfoil (one-year-old preparation) followed by 1 % gold chloride
- (26.) Test with Capillary Dynamolysis of prepared milfoil (eight-year-old preparation) followed by 1 % gold chloride

(1.) Introduction

Everybody knows this plant **Milfoil**, or **Yarrow**, or **Achillea Millefolia.** It grows in our pasture grounds and along the hedgerows. It has many leaves cut into a multitude of fine small parts. The leaves are of a deep-green colour. The stalk is greyish-green and the small flowers usually white, but we often find among them others of a delicate pink. It blooms generally from August to the middle of September, and Culpeper tells us, that this plant is under the government of the planet **Venus.**

The name **Achillea** points to the connection with the Greek hero Achilles. We are told that Achilles had been taught the use of this plant by the great **Chiron.** Achilles had taught it to Patroclus and healed King Telephus, who was badly wounded. In antiquity Milfoil was used to stop bleeding. It has also had the name "stratiotes" which means "herb of the soldiers".

In the Middle Ages we find this plant named "supercilium Veneris": "the eyebrows of Venus". It was used to purify the blood, to stop interior and exterior bleeding. It was a popular remedy for liver and kidney troubles, deficiency of the bladder, weakness of the digestive organs, etc. Externally it was used for compresses on wounds or ulcers; and in the bath for rheumatism.

Yarrow contains bitter substances and therefore has been used instead of hops for making beer.

The chemical analysis proves that the leaves of milfoil contain a certain amount of prussic acid, a nitrogenous bitter substance tannic acid, Achillea acid, which is considered identical with aconite acid, and various nitrates. In the roots traces of sulphur have been found. The leaves contain more of the bitter substances, the flowers more of the oily substances. There are also aromatic oils in the roots which smell like valerian. The oil which is distilled from the dried herb contains vineol, pinene, limonene, thujone, bomeol, camphora, caryophyllin, azulene, acetic acid, isovalerian – and formic acid ester, eugenol, methyl and ethyl alcohol, formaldehyde, acetone, furfurol. We must be thankful that our scientific methods are able to find all these details. Yarrow is such an insignificant plant – and yet so many substances work in it.

Rudolf Steiner emphasizes, that the milfoil is a plant in which sulphur plays a specific role. Sulphur is in an ideal relation to the other substances.

The chemical analysis of this plant reveals that there is sulphur in the roots.

Rudolf Steiner suggests taking the flowers of milfoil and enclosing them in the bladder of a stag and hanging this bladder in the sun during the summer. During autumn and winter it has to be buried in the soil, not too deeply. The following spring the preparation is finished and may be added in a small amount to enliven the manure heap.

This suggestion may seem very strange. The cow manure must be enclosed in a cow-horn to concentrate its power (see Chapter I). The flowers of milfoil must be enclosed in the bladder of a stag. We find that in medicine this plant is considered to be a remedy for kidney troubles and deficiencies of the bladder – so there **must be a relationship between this plant and the process taking place between the kidneys and the bladder.**

The most prominent feature in a stag are the antlers. They give this animal a kind of majestic beauty. The stag is not such a phlegmatic animal as the cow – it is a very nervous creature. If we have ever had the opportunity of watching a stag in its natural surroundings, we see that it uses its antlers as sense organs, far-reaching sense organs, with which it communicates with the envi-

ronment. The antlers are the weapons that stags use when they fight each other for the rulership of the herd.

Wherever the organism produces a horny layer (as was mentioned in the chapter about the cow), that is a sign that certain forces which stream out of the organism through the skin, are pushed back and reflected into the inner organism. But if we look at the antlers of a stag we get the impression that there certain forces are radiating outwards from the inner organism into the surroundings. It is different in the case of horns; here forces are pushed back. They revert to the inner organism. The form of the wide-spreading antlers indicates the opposite stream of forces; the stag lives more in connection with its surroundings. All animals which have antlers, are "nervous". We can even see it in their eyes. What a difference there is between the expressionless staring of the cow, and the furtive glance of the stag, who is always prepared to flee, to escape into the solitude of the forest. The slightest noise frightens these animals – when a cow would not even turn its head.

Our task was to find out why it is necessary to use the bladder of the stag. What are the specific qualities of this organ?

We tried to obtain a stag's bladder as soon as possible after it had been shot. Fortunately we knew a forester who was interested in our researches, and sent us the bladder immediately after the stag was killed. But we did not only want the stag's bladder – it had to be sent in perfect condition with its contents. We desired to study the formative forces of the urine by means of capillary dynamolysis.

(2.) The Urine of a Stag

The excretion of the stag has quite a pleasant smell. We made as many experiments as possible with the amount of urine which was at our disposal. We got a fairly large bladder containing about 200 c.c. urine. Fig. 208 represents the picture we had from the urine alone.

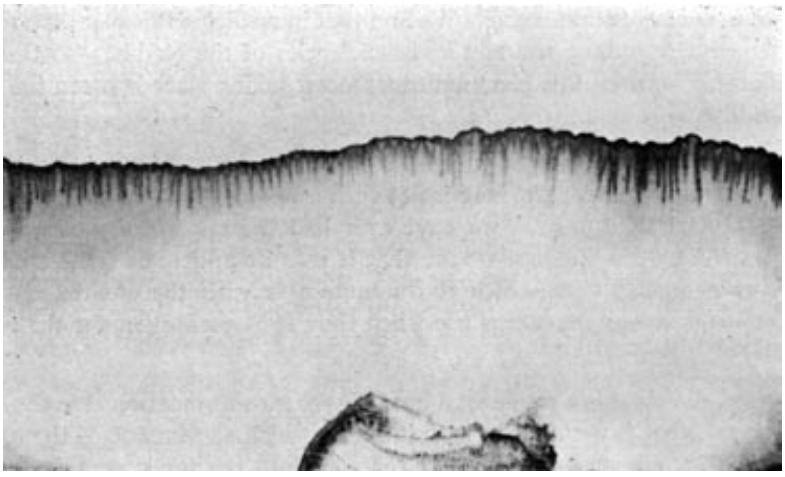


Fig. 208 Urine of a stag

It did not rise very high, the border line was coloured yellow with tiny waves, intersected by sharp pointed short lines. We made a large series of similar pictures and began to add the various metal salt solutions.

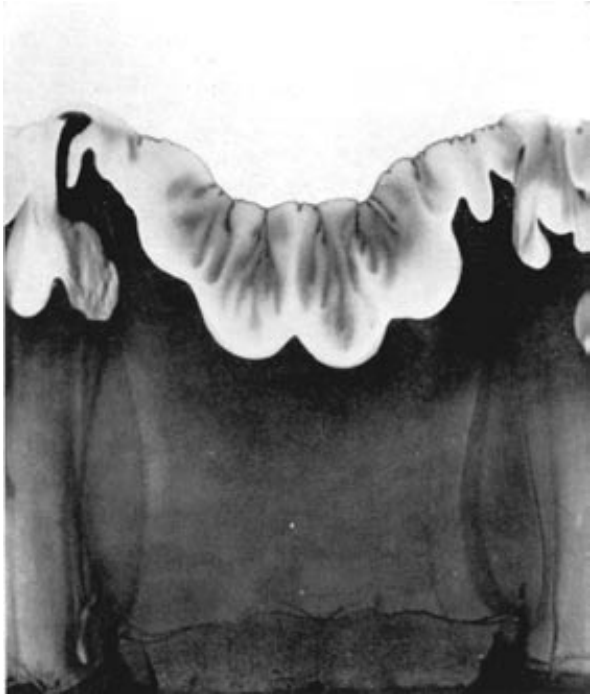
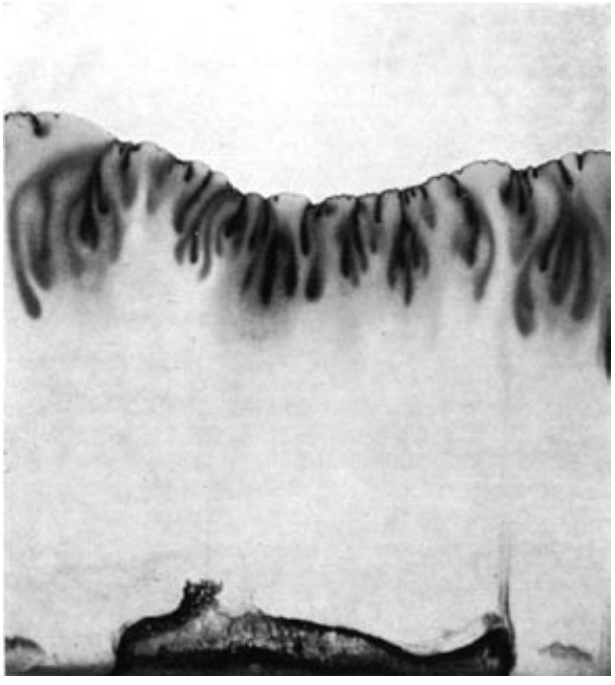


Fig. 209 Urine of a stag followed by 1% silver nitrate

This is a very characteristic formation. At the top of the picture delicate plant-like structures, of pale greenish-yellow colour, are met by a dark frame of brown silver contours.

Fig. 210 Urine of a stag followed by 1% quicksilver chloride

This picture looks less powerful. At the top we find plant-like structures, similar to those produced with nitrate of silver.



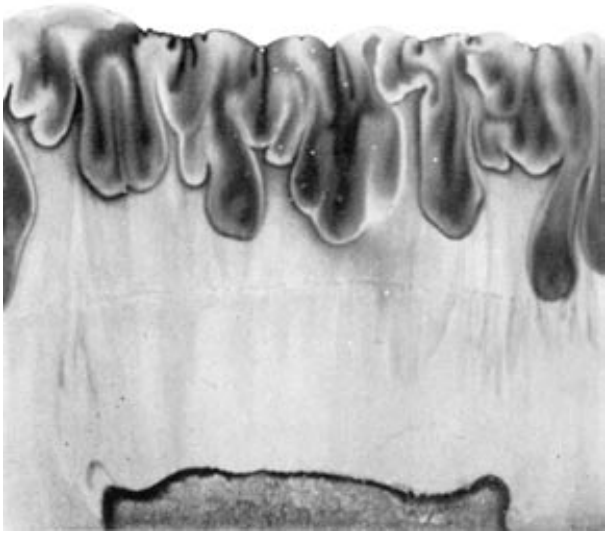


Fig. 211 Urine of a stag followed by 1% copper sulphate

This experiment again is very interesting. The copper sulphate has changed the plant-like structures at the top, and each group is surrounded by a bluish-green copper line. The top is slightly yellow, the darker shades are a delicate green. The original was very beautiful and gave the impression of being moulded; this is even obvious to a certain degree in the photograph.

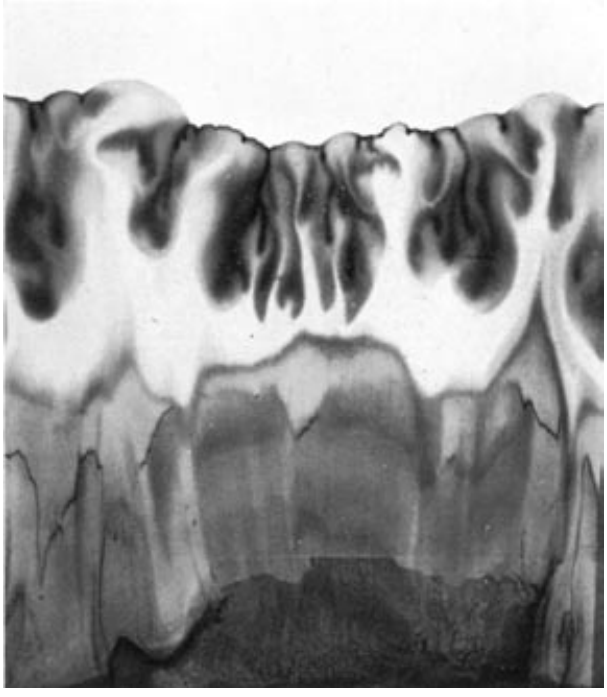


Fig. 212 Urine of a stag followed by 1% gold chloride

The plant-like structures at the top are "similar in strength to those .developed with the help of copper sulphate, but they are not framed in. The lower part of the picture is less due to the urine as far as the forms are concerned. The colours in the original were clear and bright; the gold could display its own beauty.

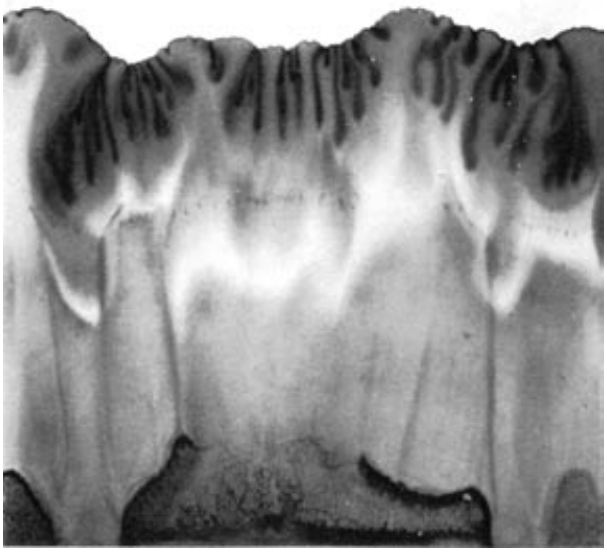


Fig 213 Urine of a stag followed by 1% iron sulphate

The top line shows the same plant like structure as the previous experiments The outer contours are more veiled and blunt The lower part is moss green, due to the reaction of iron with the tannic acid contained in the urine of the stag

Fig 214 Urine of a stag followed by 1% tin chloride

The tin again forms the upper part much more clearly than the iron the lower part is insignificant

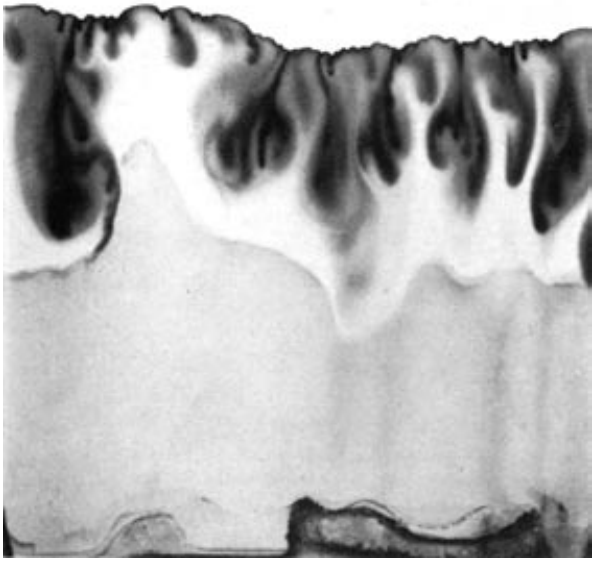


Fig 215 Urine of a stag followed by 1% lead nitrate

This metal salt produces the least clear picture of the whole series.

If we had to choose according to the characteristic formations we should select in the first place the experiment with copper, in the second the experiment with silver, then gold, tin, iron, quicksilver and lead.

The next series of experiments is earned out with the reversed method (see Part II Chapter VII) We first use the nitrate of silver, then add the urine Here we get the most marvellous effect possible The stag reveals itself in its specific formative forces.

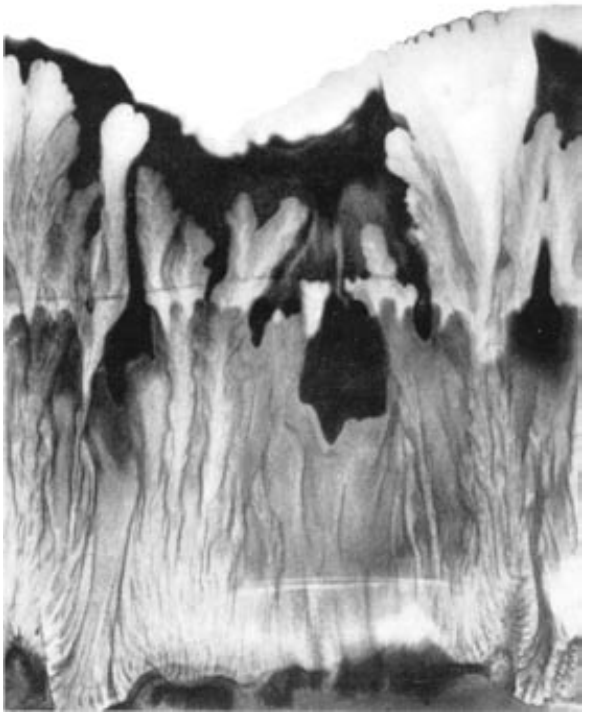


Fig 216 1% Silver nitrate followed by wine of the stag

Plate IV

1% Silver nitrate followed by excretion of the stag

It is scarcely necessary to describe this picture. The nature of the stag is inscribed so clearly, that often when we had the opportunity of showing visitors the original experiment and asked: what do you think has been used here? It is the excretion of an animal, but which animal do you think? The unprejudiced visitor exclaimed: "Well, I would guess it is a stag, a deer. But how could you get the urine of a stag? It looks like antlers." – That is perfectly true.

Our Capillary Dynamolysis reveals that there is actually a connection between the antlers and the excretion. The same formative force streams through the kidney system, penetrates the urine, and may be revealed with the help of our subtle method. Now we can imagine that the milfoil flowers which we enclose in the bladder of the stag, undergo a specific process of fermentation, if those radiating forces are kept intact.

We made similar experiments with many stags and the characteristic "antler" formation is always visible. To prove that our statement is true, two more examples out of a great quantity of material are given here.

Fig. 217 1% Silver nitrate, followed by urine of a stag

Fig. 218 1 % Silver nitrate followed by urine of a stag

Once by chance we had the bladder of a stag which was diseased The bladder was rather small, hard to the touch, and later we found a dermoid cyst inside The smell of the urine was less pleasant than usual, and our capillary dynamolytical test had the following result

Fig 219 1% Silver nitrate followed by the urine of a diseased stag

The urine is unable to act in the way a healthy stag's excretion would do. Of course we did not use this bladder for the milfoil preparation. It could not produce a healthy influence on the fermentation of a manure heap.

It is essential for a good preparation to use a fresh bladder. We know that many mistakes are still made by those who get the stag's bladder in a dried condition. The dried bladder looks quite clean, and it is perhaps more convenient to handle – but has lost many of the essential forces. We will refer to this in greater detail later on.

Always in making this preparation we try to obtain the bladder with its content; then open it, empty it, and immediately fill it with milfoil. It is not so unpleasant to handle if we try to understand what wonderful forces we are learning to master, and we easily forget that our hands are touching a bladder and come into contact with urine. "All is not gold that glitters", and all is not dirty that smells. Then we hang the bladder somewhere in the sun. We soon find out that the birds like to peck into it, and we must protect it by surrounding it with a wooden frame covered with muslin. In October we bury the bladder, taking great care not to damage the thin skin. A hole is dug, about one foot deep, in good soil; we remove every stone, place the bladder in the hole, and cover it carefully with soil.

Next spring the milfoil is ready to be used. We find the plant changed. A faint smell like that of the stag's urine impregnates the whole content. If we have handled the preparation with sufficient care, the skin is still unharmed, and we prefer to keep the milfoil in the bladder, taking out only the tiny amount we need for the manure heap. It is not more than what we can take between our fingers.

How to discover, that the prepared milfoil is different from the unprepared:

We have studied the whole problem very carefully for some years. There are many points about which we wish to become quite clear. Perhaps the first question may be: does milfoil influence plant growth at all if used in such a small amount? The answer has been given in the chapter on "smallest entities".

It is impossible to include here all the experiments carried out, but at least mention can be made of what we have done in testing the influence of milfoil in different concentrations. We studied, therefore:

(1.) An extract of the fresh green leaves with rainwater, potentized to the 60th potency.
(2.) An extract of the fresh flowers with rainwater, potentized to the 60th potency.
(3.) An extract of the whole herb with rainwater, potentized to the 60th potency.
(4, 5, and 6.) the same experiment carried out with the dried plant.
(7.) An alcoholic extract of the herb potentized with rainwater to the 60th potency.

These experiments gave a good basis for Judging whether there is a difference to be found between the influence of "unprepared" milfoil potencies; and milfoil which has undergone the process of fermentation in the bladder of a stag, exposed to the forces of the sun in summer, and to the terrestrial forces during winter beneath the surface of the soil.

In reviewing all these experiments we must admit that a difference is to be seen in the whole character of the charts obtained. It is especially noticeable that the prepared milfoil influences the growth of the roots. The higher the potencies, the stronger the effect.

The next problem is what would happen if we did not use the bladder of a stag, but that of another animal? Would it be just the same to enclose milfoil in the bladder of any animal whatsoever?

We think that this question is answered by looking at the picture obtained by Capillary Dynamolysis. These experiments show definitely that the stag's urine is of a unique quality. Neither the cow, nor the horse, nor the pig have similar radiating forces. Still, to be perfectly sure, we make a comparative experiment.

Comparison between milfoil kept in the bladder of a stag, pig, fox (male and female)

Fortunately in the year 1934 we obtained not only the bladder of a stag, but at the same time, immediately after the killing, the bladders with their contents, of a male and a female fox. It was easy to get the bladder of a pig, with its contents. At first we made the test with Capillary Dynamolysis and had the usual pictures for the stag's and pig's urine. The fox did not prove successful with the addition of nitrate of silver, but quite characteristic formations with gold chloride were obtained.

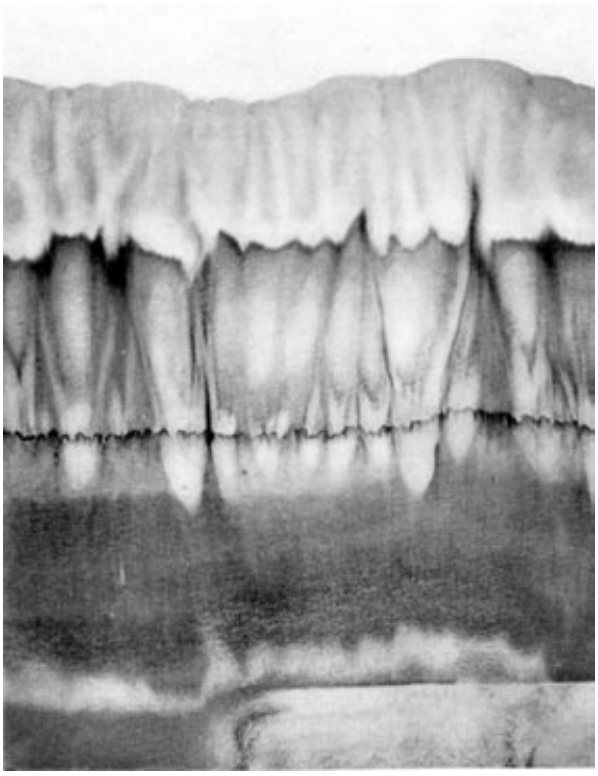


Fig. 220 Urine of a male fox followed by 1% gold chloride

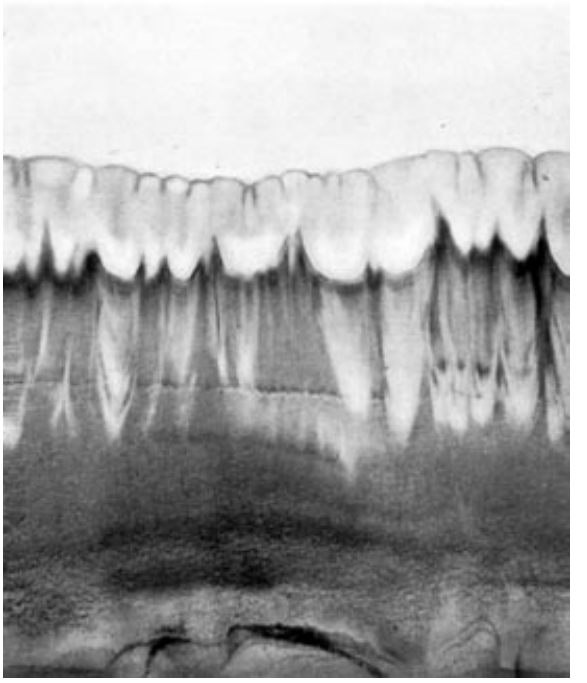


Fig. 221 Urine of a female fox followed by 1% gold chloride

The more animals we studied, the more we were convinced, that the stag's urine possesses unique radiating forces.

The flowers of milfoil were put into the different bladders, then kept under different frames covered with muslin in the sunshine, and between October and March they were buried one foot deep, beneath the surface of the soil.

The next year (1935) we started the experiments to potentize the different milfoils. Each of the different preparations smells according to the bladder used. The smell of the pig's bladder is not very agreeable, that of the fox has a more stinging quality, and there is the pleasant resinous smell of the milfoil kept in the stag's bladder. The extract is made in the following way: 10 grams of the milfoil and 100 c.c. rainwater are put in a clean glass bottle and exposed to the sun. From time to time the liquid is vigorously shaken. After three days the extract is ready to be used. It is surprising to see the different colours of the various extracts; that from a pig's bladder is somewhat cloudy and light-yellow; milfoil kept in a stag's bladder is clear and light brown. From these extracts we again made pictures with different metal salt solutions and also made potencies up to the 60th potency. We obtained the following results:

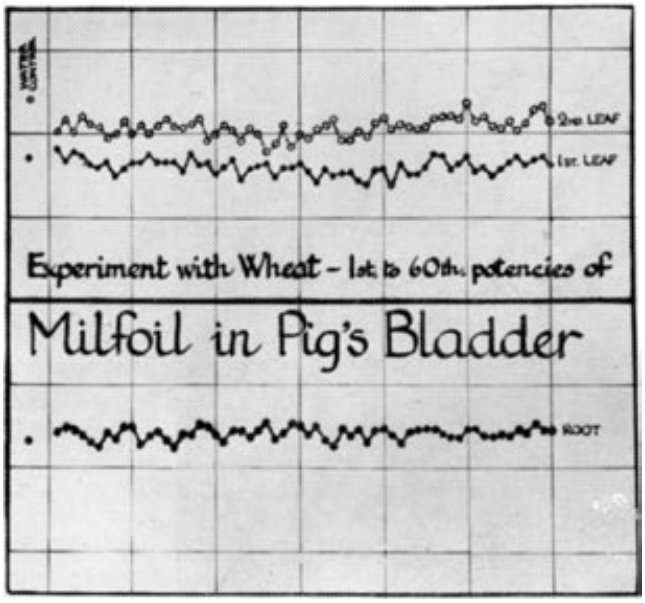


Fig. 222 Wheat plants grown under the influence of 1st-60th potencies of milfoil kept in pig's bladder

It is an harmonious looking graph, indicating maximum growth in the higher potencies (50th and 59th). The minima are scarcely distinguishable. There is not much variety in this graph.

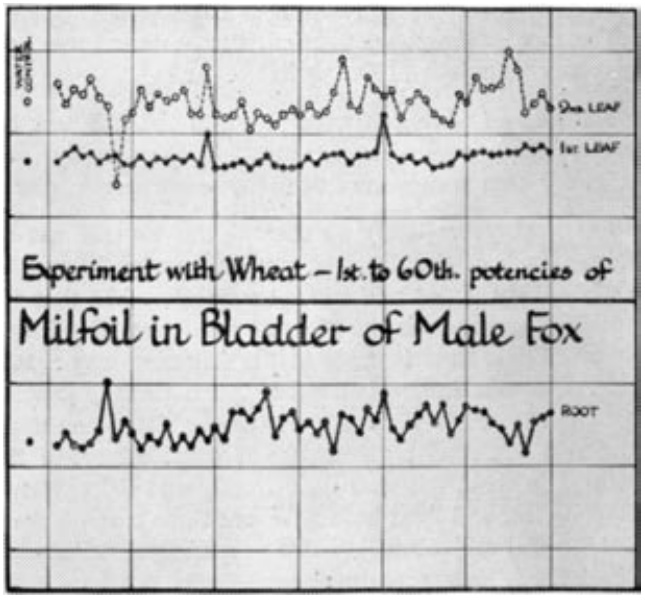


Fig. 223 Wheat plants grown under the influence of 1st-60th potencies of milfoil kept in fox's bladder (male)

Much more is to be seen here. The movement is characteristic so far, in that the growth of the first leaf runs on a more or less even line, suddenly interrupted by a jump to maximum growth, (19th and 40th potencies). The water control plants show that for the most part the first leaf remains within the limit of "water", the higher potencies are definitely better than the control and the maxima are beyond doubt.

The second leaf shows a very early minimum at the 8th potency. It is a very strong minimum which lies even beneath the growth of the first leaf. We find three maxima. The first one coincides with the maximum of the first leaf (19th potency), the second appears earlier (35th potency) and the third (55th potency) has no counterpart in the first leaf.

The water control plant for the second leaf shows that many potencies are below the level of the control, that the minimum is far smaller than the control, and the three maxima show decidedly enhanced growth.

The growth of the roots is for nearly the whole series of potencies much smaller than the water control plant indicated. So we must say that the milfoil kept in the fox's bladder has not a favourable influence on the growth of the roots. The first minimum (7th potency) does not coincide with the minimum of the second leaf, the second (26th potency) has no counterpart in the growth of the leaves, the third (40th potency) is the only one which coincides with the first leaf – only there we have a maximum. The maximum is at the 34th and the second maximum at the 57th potency. They also do not coincide with maximum growth in the leaves.

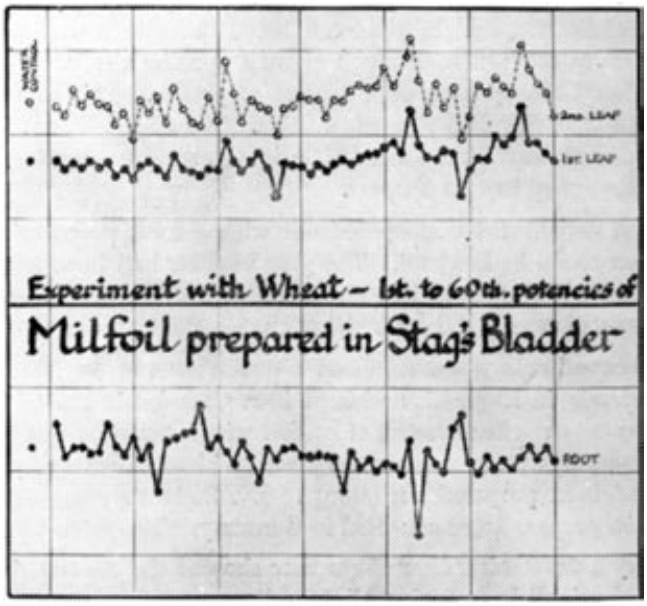


Fig. 224 Wheat plant grown under the influence of 1st-60th potencies of milfoil kept in stag's bladder

The first leaf has the first maximum at the 21st potency; the second at the 43rd potency; and the third at the 56th. Minima are at the 27th and 49th potencies. At the beginning the plants are at

the same level, or sometimes below the water control plant; the higher potencies are much more advanced in growth.

The second leaf has the maxima at the same potencies, 21st, 43rd and 56th. Also the minima coincide (27th and 49th potencies).

The growth of the roots shows as minima the 18th and 49th potencies; as maxima the 13th and 44th potencies. At the beginning the roots are below the water level, then they are much advanced.

Such a short description of the graphs is of course insufficient; we must leave it to the reader to study them intimately. The graphs are the pictures of living forces working in plant growth, if we earnestly try to understand their language. That takes time, and here we can only point out the direction in which it is useful to begin the study.

Rudolf Steiner said that this milfoil can be kept as long as one likes. According to the size of the bladder, quite a large amount of milfoil preparation may be made, and we need only a tiny amount for one manure heap. So it may be interesting to know for certain **how long such a preparation may be kept.** This preparation is especially precious, for we may have difficulties in obtaining stag' bladders.

We report one more experiment, carried out here in England in 1939. To answer the above question, I used milfoil which had been kept in the original bladder from 1931 until 1939, so that it was **eight years old.** It was made in Germany in the Biological Institute and kept carefully in a box, covered with pulverized peat moss. The bladder was still in good condition, the skin was nearly intact. We took out 1 gram of dry milfoil through a small opening cut into the bladder, and immediately closed the opening with a piece of plaster. This was essential. The content still smelt faintly -like the stag's urine. We added 10 c.c. lukewarm rainwater to the milfoil, and placed the bottle in the sun, as described for the other experiments mentioned in this chapter.

The second experiment was carried out with a fresh preparation (1 year old) which had been made in England. The stag bladder had been acquired in a dry condition, without the urine in it. The smell of the bladder was very faint, and the milfoil extracted from it did not smell so characteristically as that of the old one.

The third experiment was carried out with the same amount of milfoil collected one year previously in England, and kept in a glass jar in the laboratory. Thus we could compare the effectiveness of milfoil which had not undergone any preparation, but which came from the same place and had the same age, as the second one, which had been prepared according to Dr. Steiner's suggestions. The third milfoil had been prepared and collected in Germany, eight years ago.

The watery extract after three days time showed the characteristic differences. The unprepared milfoil looked clear, light yellow, and did not smell at all. The one-year-old preparation of milfoil was a slightly darker yellow, but not very different, and smelt faintly disagreeable. The eight years old preparation which had been inserted into a perfectly fresh bladder immediately after the liquid was removed, had a rather dark brown colour and smelt pleasantly. From each of these extracts 60 potencies were prepared, and three series of experiments were carried out at the same time.

Fig. 225 represents the graph for the experiment carried out with the unprepared milfoil.

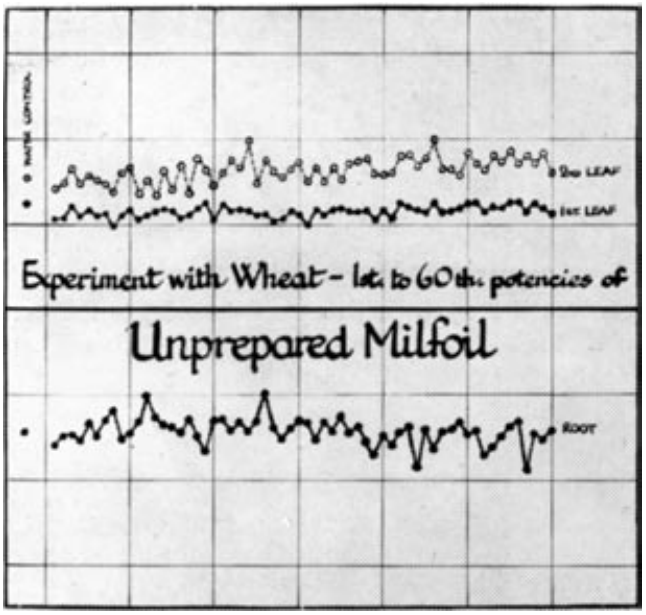
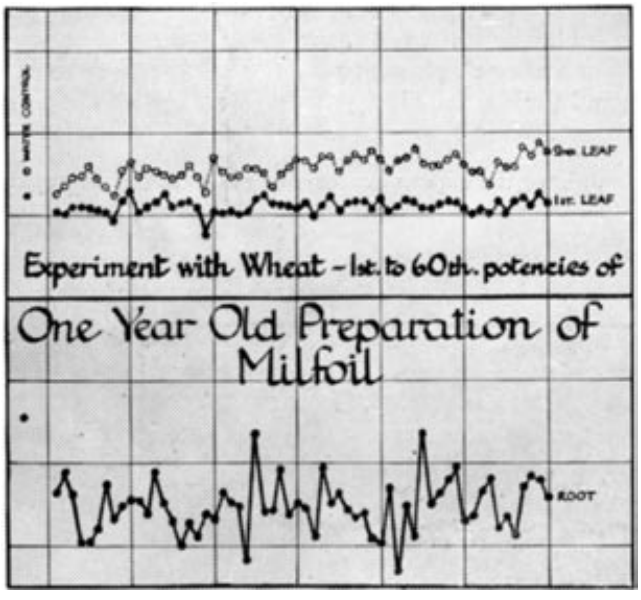


Fig. 225 Wheat plants grown under the influence of 1st-60th potencies of unprepared milfoil

There are two maxima to be seen in the second leaf, the 24th and the 46th potencies. The roots have two minima at the 12th and 26th potencies, two maxima, the 44th and 57th potencies and on the whole we might say that with increasing potencies, the growth also increases. If we divide the graph in two phases, we might take for the first half the 19th potency as a smaller maximum between the two distinct minima.

Fig. 226 Wheat plants grown under the influence of 1st-60th potencies of milfoil kept in stag's bladder (one - year - old English preparation).



This graph is at the first glance disappointing. There is a minimum at the 19th potency, then the plants increase, but we miss the usual distinct maxima.

The roots are very well developed, they are exceedingly long and strong. We find two minima at the 25th and 45th potencies; two maxima, at the 24th and 42nd potencies. It is a unstable movement for the roots.

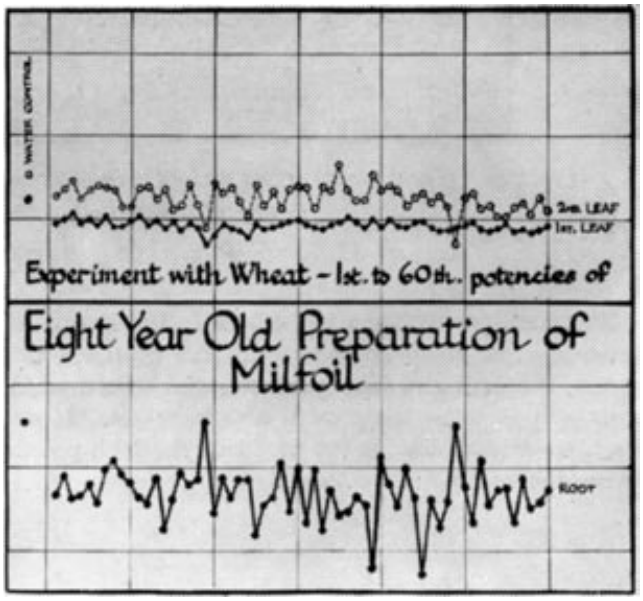


Fig. 227 Wheat grown under the influence of 1st-60th potencies of milfoil kept in stag's bladder (eight-year-old preparation)

This graph is more distinct. We have the first minimum at the same potency (19th) for the first and second leaf, and a second minimum at the 49th potency. There is one maximum at the 35th potency.

The roots are also very well developed, and the minima coincide with the minima for the leaves (19th and 49th potencies). There are two maxima at the 39th and 45th potencies, but the movement is exceedingly restless.

It is difficult for an inexperienced person to judge these three charts for the measurement. With our many years experience we do not hesitate to declare that the best result is obtained with the eight-years-old preparation. Still we will try to find a more obvious result for these experiments by taking the weight for each potency.

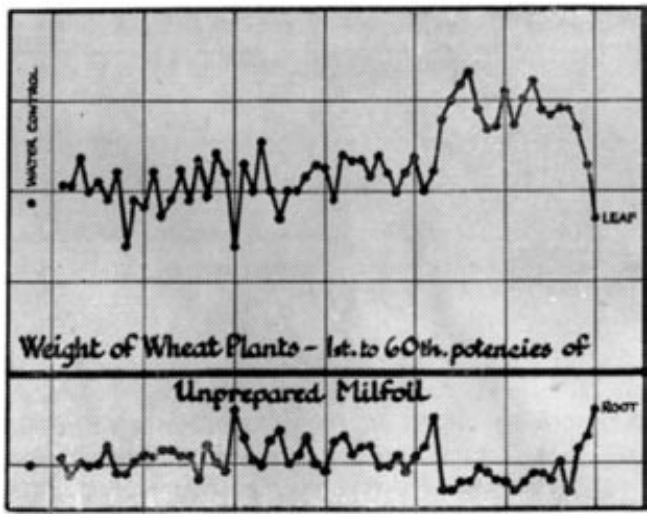


Fig. 228 Weight of wheat plants grown under the influence of 1st-60th potencies of unprepared milfoil

The weight divides the graph into three parts. Between the 40th and 60th potencies the plants are much heavier, the leaves as well as the roots. The leaves have two minima at the 8th and 20th potencies. The roots have two minima 20th and 42nd potencies, and two maxima, 43rd and 57th potencies.

It is interesting to see that the highest potencies enable the plants treated with them to **put on weight. Weight is not due to the material influence of some substances added as "plant foods", but to the action of an immaterial force.**

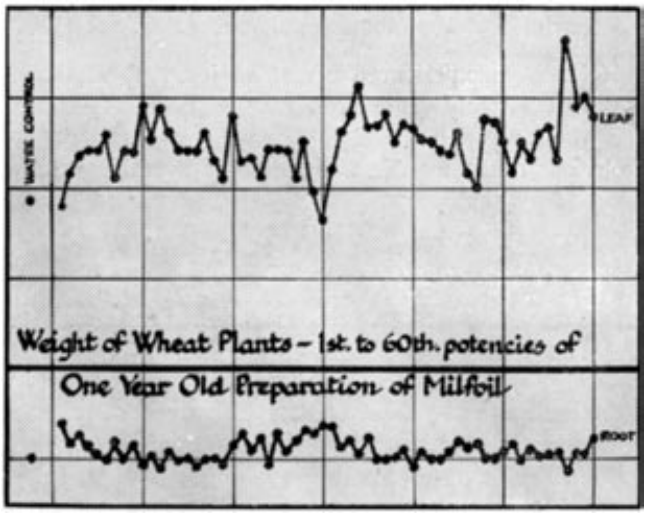


Fig. 229 Weight of wheat plants grown under the influence of 1st-60th potencies of prepared milfoil (one-year-old preparation)

This graph is perfectly clear. It is divided into two parts. The first period for the leaves has the maximum between the 10th and 12th potencies, the minimum is the 30th potency. The second period has a smaller maximum (but bigger than that of the first period) at the 34th, and a very high maximum at the 57th potency.

The roots look very harmonious (it is amazing to compare the weight with the measurement of the roots); the minimum is between the 30th and 31st potencies. It is a strange phenomenon which happens again and again that the weight may be opposite to the measurement. (All these phenomena can be explained in detail, if once the opportunity arises to publish all our experiments dealing with the problem of "smallest entities". These researches were started in 1919 and an immense amount of material has been collected.) The restless movement of the roots has disappeared, the more smooth graph for the leaves has become full of life. We see distinct maxima and minima. The long roots have not much weight, the same leaves are rather heavy.

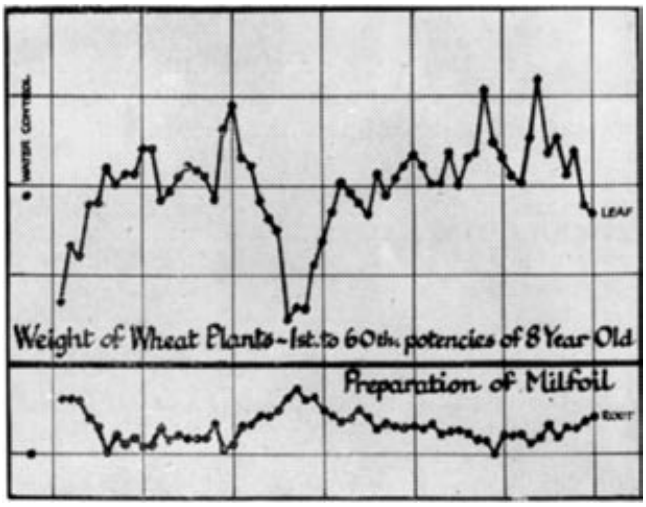


Fig. 230 Weight of wheat plants grown under the influence of 1st-60th potencies of prepared milfoil (eight-years-old preparation)

Here also the graph is divided into two periods, the first one having the maximum weight at the 20th potency, and minimum between 26th and 28th potencies. The second period has two maxima, (48th and 54th potencies). The roots show the same harmonious movement as Fig. 227, but they are more distinct in forming maxima and minima. The minimum divides the graph into its two periods (27th potency). The first period has two maxima, the 6th and 19th potencies; the second period has one maximum at the 49th potency.

The eight-year-old preparation is stronger in its effects than the one year old. We hold this to be entirely due to the fact that the bladder has been used in a perfectly fresh condition, shortly after the stag has been killed. On the other hand the graph for the weight proves that the one-year-old preparation is very similar. It is also a good preparation, with much power of vitalizing plant life, but it could be better.

Once more we recommend everybody who wishes to make this preparation for himself, to try and get the bladder fresh with the content. Exchange the natural content of urine for the milfoil as quickly as possible, so that the living process of this organ is not too much disturbed. Never wash the bladder outside or inside. Here we must try to preserve the natural condition as far as possible. Fill the bladder well; the milfoil can be pressed without damaging the organ; then wind a thread round the opening and close it tightly. The bladder should smell inside. If an organ exudes an odour, that is a sign that forces are streaming out, and are leaving the organ. The bladder must exude these forces into the milfoil, which is enclosed within it. The bladder has to ferment the milfoil, to penetrate it with those marvellous radiating forces which are revealed by the capillary dynamolytical test.

Sometimes it happens that a bladder is available when there are no fresh plants at hand. In this case we may take the dried flowers. These are a little stiff and could damage the skin of the bladder. We avoid this (the bladder is useless if there are tiny holes in it) by making a tea from the green milfoil leaves, or dried leaves, the dried flowers are soaked in this tea, then they become soft again and can easily be filled into the organ.

The last test we made with the above three preparations was the capillary dynamolytical one.

Fig. 231 Unprepared milfoil, 1 year old, followed by 1% gold chloride

The first picture is rather dull. The colours are dark purple and light purple. The top line is yellow with some green shades.

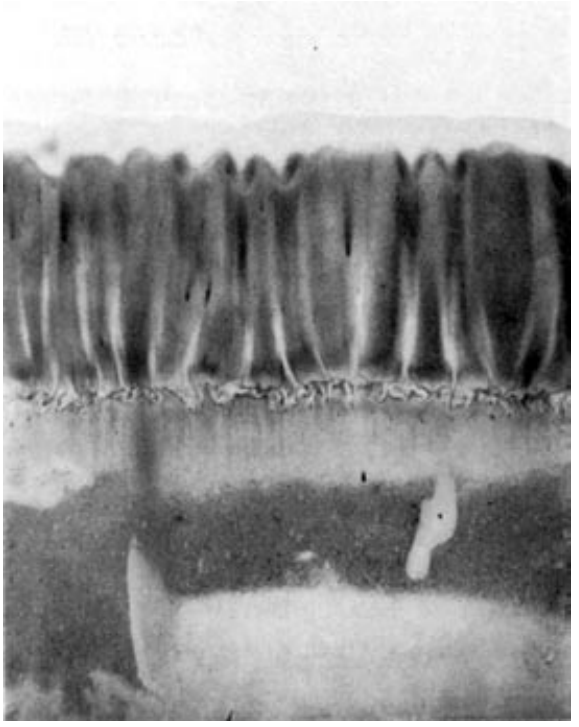


Fig. 232 Prepared milfoil, 1 year old, followed by 1% gold chloride

The second picture is clearer, the colours are brighter, and some radiating forces are visible in the upper part.

The third picture is the best. The original was very beautiful in colour and form. The radiating forces are fully developed. Also these experiments indicate that the old milfoil is the strongest.

It is interesting that we are able to use such a well prepared, precious substance even after eight years have passed. Therefore it is well worth while spending money and time to make it quite perfectly. We can never get any artificial fertilizer which is so cheap and so good.

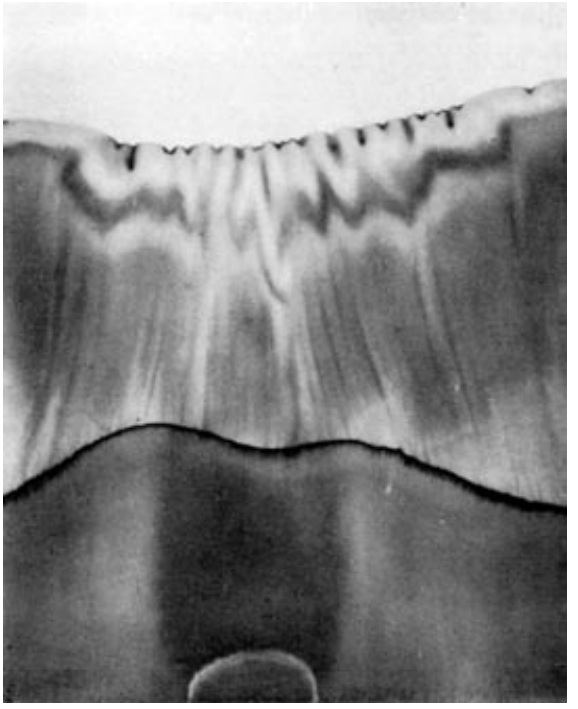


Fig. 233 Prepared milfoil, 8 years old, followed by 1% gold chloride

Chapter VII.
STINGING NETTLE PREPARATION.

(1.) Introduction.
(2.) Experiments:
  (1.) The homoeopathic effect of the 1st-60th potencies of unprepared stinging nettle on the growth of wheat plants.
  (2.) The same experiment with prepared stinging nettle.
(3.) Tests with Capillary Dynamolysis:
  (a.) Extract of stinging nettle.
  (b.) Extract of unprepared stinging nettle followed by 1 % gold chloride.
  (c.) Extract of prepared stinging nettle followed by 1% gold chloride.
  (d.) Extract of unprepared stinging nettle followed by 1 % iron sulphate.
  (e.) Extract of prepared stinging nettle followed by 1% iron sulphate.

(1.) Introduction

Dr. Steiner called the stinging nettle one of the greatest benefactors to plant growth. Its qualities are manifold. It has not only potassium and calcium radiation, but also a specific iron radiation, which has just as much importance for nature, as the iron radiation has for our own blood. T**he stinging nettle regulates the iron household in nature.** For instance, if there are places where too much iron is in the soil, it is possible to free the soil of this superfluous iron by planting nettles here and there on places where we do not mind them growing. The nettles attract the iron and thus other plants get less.

This changes our whole outlook, if we know the real function of such a plant, which we often try to destroy, 'because it is sometimes- disagreeable to get into "touch" with it. We really should be very grateful if we find nettles in the vicinity of our farms or gardens. No wonder that Rudolf Steiner suggests that this plant should be included in the preparations we add to our manure heaps. Nothing special has to be done with it. We simply collect as many as we can, let them fade slightly, and then bury the plants in the soil. Here we may use some peat moss to isolate the plants from immediate contact with the soil. The nettles must stay in the soil for a whole year; they must remain for one winter and one summer beneath the surface, and then they are ready for the compost heap.

It is good to recollect what we know about nettles, because sometimes we are inclined to forget the valuable qualities of a thing with which we are unreasonably annoyed because of its disagreeable aspects. The stinging nettle (urtica dioica) grows a yard or more high, has a creeping root and a ridged stem which is beset with little prickles or stings. These stings have a perforation at the point and a little bag at the base. In touching the plant, we press the sting, and it enters the skin. At the same time an acrid liquor from the bag, which produces a burning sensation, is pressed into the wound. The leaves are covered with these stings also. The flowers are greenish-white and insignificant. We find stinging nettles nearly everywhere, by roadsides and in hedges.

Culpeper tells us, that this plant belongs to the planet **Mars.** No wonder, because since the oldest times the planet Mars has been known to be connected with the metal iron. There is an old saying: "Mars is the God who makes the iron grow." We can say equally well that Mars is the God who makes the nettles grow, and we should not be wrong. The plant flowers in July and is

used to combat many diseases. "It consumes the phlegmatic superfluities in the body of man, that the coldness and moisture of winter has left behind. The roots or leaves boiled, or the juice of either of them, or both, made in an electuary with honey and sugar, is a safe and sure medicine to open the passages of the lungs, which is the cause of wheezing and shortness of breath, and helps to expectorate phlegm, also to raise the imposthumed pleuresy; it likewise helps the swellings of both the mouth and throat if they be gargled with it. The juice is effectual to settle the palate of the mouth to its place and heal the inflammations and soreness of the mouth and throat. If the decoction of the leaves be drunk in wine, it will provoke the courses, settle the suffocation and strangling of the mother, and all other diseases thereof; as also applied outwardly, with a little myrrh. The same, or the seed, provokes urine, and expels the gravel and stone. It kills the worms in children, eases pains in the sides, and dissolves the windiness in the spleen as also the body. The juice of the leaves taken two or three days together, stays bleeding at the mouth. The seed being drunk, is a remedy against the bites of mad dogs, the poisonous qualities of hemlock, henbane, nightshade, mandrake, or such herbs as stupefy the senses; as also the lethargy, especially if used outwardly, to rub the forehead or temples in that disease. The distilled water is effectual, though not so powerful, for the diseases aforementioned; as for outward wounds or sores to wash them, and to cleanse the skin from morphew, and other discolourings thereof. The seeds or leaves bruised, and put into the nostrils, stays the bleeding of them, and takes away the polypus. The juice of leaves or decoction of the roots, is good to wash either old, rotten, or stinking sores or fistulas and gangrenes, and such a fretting, eating, or corroding scars, manginess, and itch, in any part of the body, as also green wounds, by washing them therewith or applying the green herb bruised thereto. It eases the pains and dries or dissolves the defluctions. An ointment made of the juice, oil and a little wax, is good to rub cold and benumbed members. One handful of the leaves of green nettles and another of Wallwort, or Deanwort, bruised and applied simply themselves to the gout, sciatica, or joint aches in any part, hath been found an admirable help thereunto."

This we find in the herbal of Culpeper of about the sixteenth century.

In homoeopathic medicine of to-day the fresh herb is used as a remedy externally or internally for burns of the first degree, for itch in any part of the body (Urticaria), edematous swellings, diarrhoea, lessened urine secretion, and lack of milk after childbed. Nettle vinegar is used to enhance the growth of hair. The stalk contains a fibre suitable for making beautiful cloth. During the last war Germany tried to plant nettles especially for this purpose, and got about 13% of silky fibre from the nettle stalks. The dark green leaves are used for the production of chlorophyll.

Chemical analysis has found, amongst other substances, a rich content of potassium, calcium nitrate, silicic acid, formic acid, iron, tannic acid, mucus, wax, a red pigment – carotin (the same as in carrots).

We must also mention that the young plants are an excellent vegetable, similar to spinach; they may be used as salad, and as a good poultry food as well.

So we see that nettles are highly useful plants and should be more appreciated as a wonderful work of nature.

Many fairy tales are woven round the nettle. Who does not remember the beautiful story of the young princess who had to spin and weave garments from nettles for her thirteen brothers who had been changed into swans by a wicked witch? There is the story of the young girl who had to make her wedding dress, and the shroud of the bad overseer, to be released. The gypsies in

Europe tell about little men “pcuvush”, who live in the earth. They are very ugly, have hairy bodies and are invisible. They have three golden hairs at the tops of their heads and if they keep these uncovered, they are invisible. Whosoever can get a golden hair from these “pcuvush”, can turn stones into gold. At the entrance of their subterranean dwelling-places is a huge heavy stone surrounded by nettles. Therefore the “pcuvush” people hold the nettle very dear. The gypsies call the nettle “Kasta pcuvushengre”, “wood of the pcuvush”. Some people may wonder why fairy tales are included in a scientific book about agriculture. But all these fairy tales have been written from out of a deep wisdom and insight into nature, only we must learn to understand them again.

(2.) Experiments with the Nettle Preparation

We gather the nettles in July when they begin to flower and take the whole plant without the roots, dig a hole, and press the herbs tightly into the soil. We need nothing else for this preparation, no special animal organ is necessary, only the forces which stream through the soil during winter and summer.

It is good to take young shoots which are not yet too woody, and the next year we get the composted nettle ready for the manure, and also for our experiments. Some plants we have dried and kept in glass jars in the laboratory for comparison. We start the usual test for the homoeopathic influence on wheat plants, using 1 gram of the herb in 10 c.c. of lukewarm rainwater, and then potentize to the 60th potency.

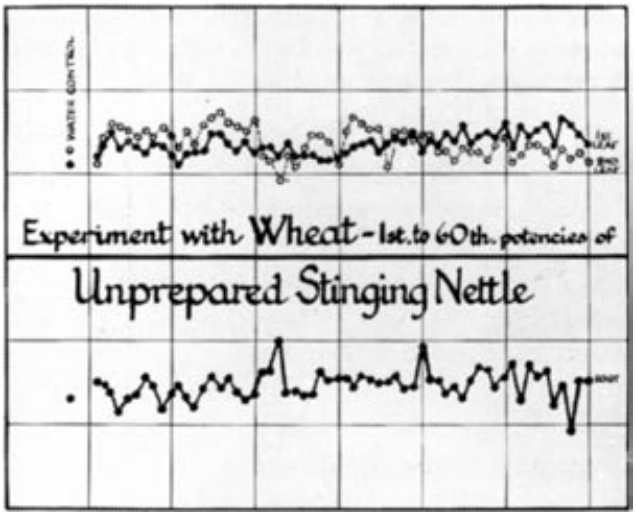


Fig. 234 Wheat plants grown under the influence of 1st-60th potencies of unprepared stinging nettle

The first maximum appears at the 16th potency, the second at the 32nd. The minimum at the 23rd potency, is a very intensive one, because the growth of the second leaf has dropped below the level of the first leaf. This phenomenon always means a strong effect. Then the second leaf rises again to the second maximum and drops once more to the second minimum at the 36th potency.

The roots have two minima at the 23rd and 40th potencies; first maximum is at the 4th and second at the 58th potency.

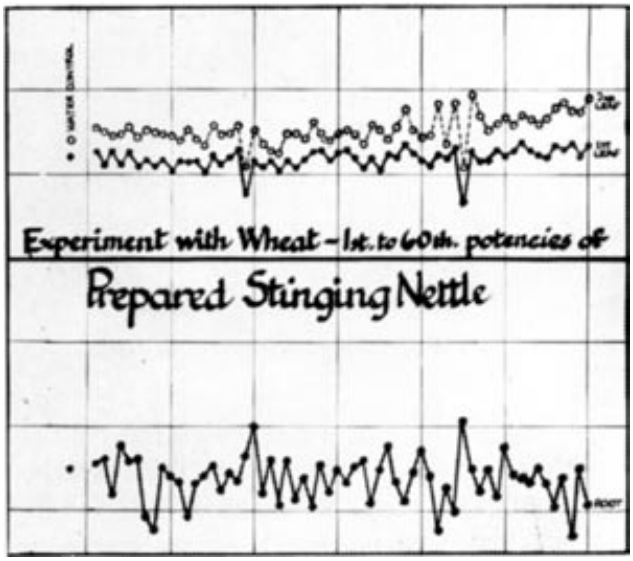


Fig. 235 Wheat plants grown under the influence of 1st-60th potencies of prepared stinging nettle

The graph shows a considerable difference. It is harmonized and much clearer. First and second leaf never overlap each other. The first minimum occurs at the 19th, the second at the 45th potency. The maximum is at the 46th.

The roots have the minima at the 20th and 45th potencies. There are three maxima, at the 8th, 42nd and 58th potencies.

Compared with the unprepared nettle, we see immediately that the roots are considerably improved with the prepared herb,

The weight shows the effect of the preparation still more convincingly. The unprepared nettle was exceedingly light in results. The prepared nettle increased the weight of the wheat plant twice and sometimes even more.

(3.) Capillary Dynamolytical Test

The extracts of the fresh and the prepared herbs are light green and of course there is not much to be seen in the picture of the juice alone. They both produce a thin light green border line.

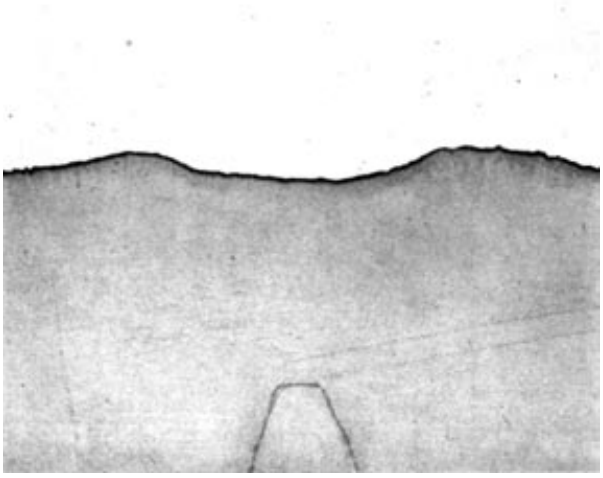


Fig. 236 Extract of stinging nettle alone

The metal salts produce different characteristic pictures. The most beautiful was with gold chloride, with especially bright clear colours: yellow, light purple and light green. It is very difficult to form an opinion by looking only at the black and white print.

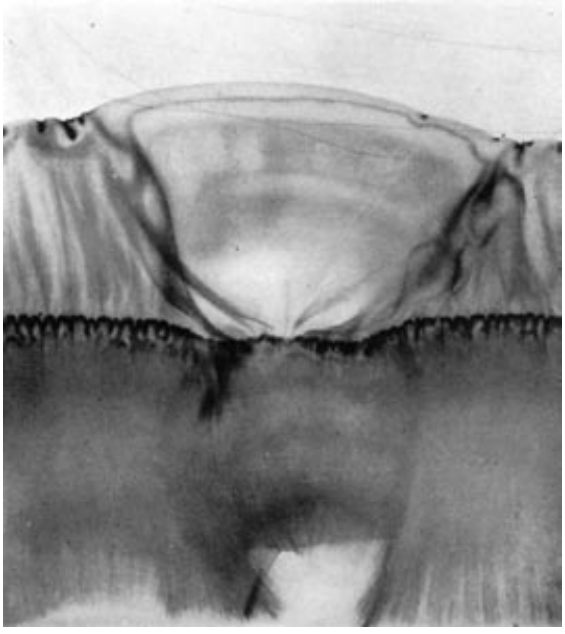
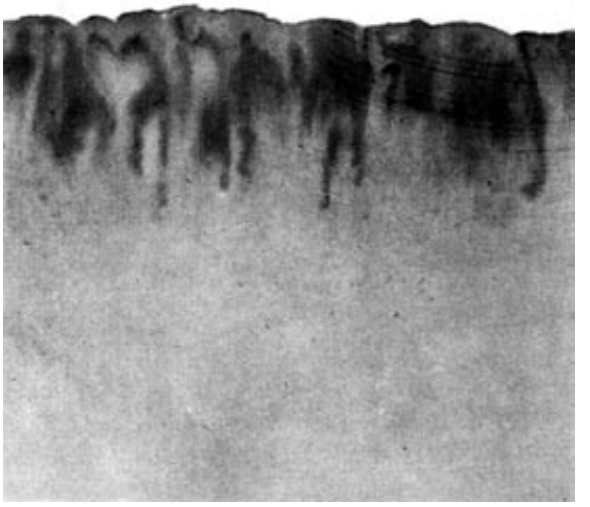


Fig. 237 Extract of stinging nettle (unprepared} followed by 1% gold chloride

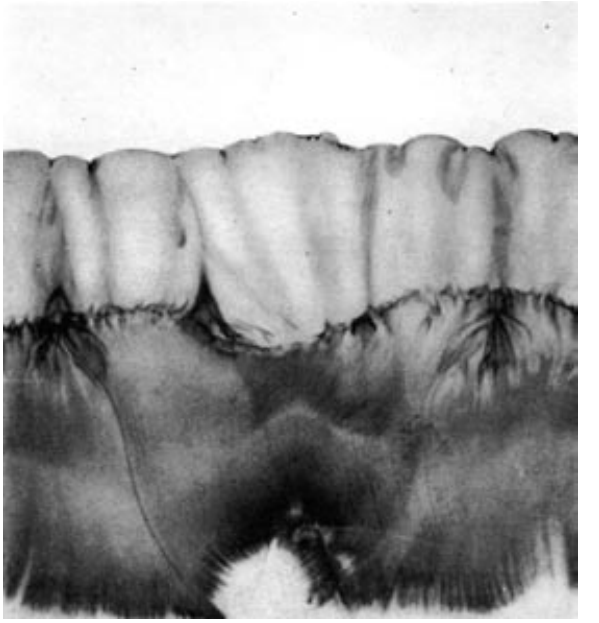


The experiment with iron sulphate changes the picture to a vivid moss green shade and from the top downward characteristic forms appear, but they are not quite clear.

Fig. 238 Extract of stinging nettle- (unprepared) followed by 1% iron sulphate

The experiment with prepared nettle and gold chloride shows a certain difference The original looked much more alive For an inexperienced eye it may be that the unprepared nettle seems even more beautiful But it is not only a question of beauty, we must learn to discriminate between mere beauty and life-forces The pictures reveal a stronger vitalizing force in the prepared nettle.

Fig 239 Extract of stinging nettle (prepared) followed fry 1% gold chloride



The greatest surprise is the experiment with the prepared nettle and iron sulphate

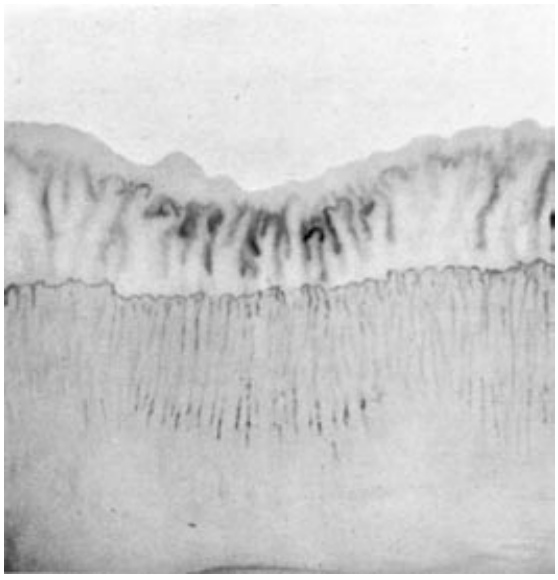


Fig. 240 Extract of stinging nettle (prepared) followed by 1% iron sulphate

That is a great surprise. The forms are very delicate, compared with those from the unprepared nettle, but they are perfectly clear. The colour has the same moss green shade. From the border line formed by the nettle extract (about two-thirds of the picture) we notice a strong radiation downwards. With the magnifying-glass we see that the structure is divided into many tiny branches, like roots growing in the soil. The iron sulphate passing through the nettle extract leaves behind this marvellous radiating structure. Is it not a real picture of the action Rudolf Steiner describes as characteristic of the nettle plant in nature? The nettle regulates the iron household, collecting the superfluous iron in the soil, so that other plants may benefit by its regulating activity.

The method of Capillary Dynamolysis is very subtle, and if we understand how to use it, we have a new scientific method which allows us to penetrate deeply into the interplay of the hidden forces in the mineral, plant, and animal kingdoms.

The nettle preparation, which has concentrated in itself the quality which the natural herb possesses, is introduced in a small quantity into the manure heap. It makes the manure sensitive and is especially helpful in ensuring that the nitrogen content of the heap is kept intact.

Chapter VIII.
VALERIAN PREPARATION.

(1.) Introduction.
(2.) Experiments:
  (1.) The homoeopathic effect of Valerian on wheat grown under the influence of the 1st-60th potencies.
  (2.) Weight of the wheat plants.
(3.) Tests with Capillary Dynamolysis:
  (a.) Fresh extract of Valerian flowers with rainwater, followed by 1% silver nitrate. Experiment carried out in 1939 in Holland.
  (b.) Similar experiment carried out with English Valerian in England.
  (c.) Dutch Valerian followed by 1% gold chloride.
  (d.) Dutch Valerian followed by 2% copper sulphate.
  (e.) Dutch Valerian followed by 1% tin chloride.

(1.) Introduction

Valeriana officinalis can be found growing in many different places. We find it where the ground is marshy, near the edges of ponds, or on the borders of woods, between bushes where the sunbeams do not penetrate directly to the plants. In contrast to this, we also find valerian growing in dry, stony places, with some varieties in mountain regions. It is a perennial plant. The root is about as thick as a finger, is brown, and spreads itself laterally with many threads on each side. The leaves are very divided, dented on the edges, some winged to the middle rib. The stalk rises a yard or more and branches at the top with many small white and purplish coloured flowers.

Culpeper tells us that this plant is under the government of **Mercury,** and is useful in malignant fevers and pestilential distempers. It helps nervous complaints, headaches, trembling, palpitations of the heart, vapours; it is alexipharmic, sudorific and cephalic. It is good in hysterical cases and epilepsies.

Usually the root is used as a remedy. The fresh root has not much scent, but the dried one has a very characteristic perfume. In reality we find this scent in the whole plant, the flower gives out a perfume as also do the green leaves if we rub them between our fingers. That is the characteristic feature of valerian – the whole plant is permeated with a strange odour. Some think that the name "valerian" is derived from the Latin "valere – to be of value, strong, to feel well", because of the enormous therapeutic qualities of the plant. In England it is also called "all heal". In the Middle Ages people used it as a protection against evil spirits, witches and demons. Even nowadays we may find a bunch of dried valerian and other flowers outside the door of old country houses, to protect the inmates from evil spirits. It was also the custom to hang a bunch of these dried flowers in the middle of the living-room. If anybody entered the room with an evil intention, the bunch began to grow restless, it moved and the farmer knew that the visitor wanted to do him harm. These bunches consisted of several kinds of flowers, but they always had some valerian in them.

Chemical analysis finds many acids in the valerian, namely the valerian acid, isovalerian acid, acetic acid, formic acid, terpineol, alcohol ($C_{51}H_{26}O$), alcaloids (chatinin and valerin), mucus, starch, resin, some tannic acids. We know so much about the different substances in this plant, and yet we are told "that until now, it is not quite clear which is the effective principle in valerian." The more details we find, the less we know of the active force:

Rudolf Steiner suggests adding valerian to the compost or manure heap because this plant helps it to find the right relation to the phosphorous substances. That is a very important statement. Of course it does not mean that we find phosphorus, as such, in the plant. The chemical analysis for valerian does not indicate the presence of phosphorus. Also Rudolf Steiner only said that valerian helps the manure to find the right relation to phosphorous substances. In other words, the plants gain the faculty of benefitting in the right way from the phosphoric substances in their surroundings. Everybody knows that the green colour in foliage, chlorophyll, can only be created by the plants, if there is **iron** in the neighbourhood. We do not find iron in every green leaf as a material substance, but if the soil were without iron, the leaves could not become green. The iron must be outside the plant organism, but it must be there; or we may say the amount of iron which the plant does take in, is in such a high dilution, that it escapes chemical analysis. The iron **radiation** acts in the leaves, but the iron material is not present in a measurable amount. Therefore it may well be possible, that the "right relation" to phosphorus can be established with the help of a special plant, which can attract those forces from the surroundings, even though we do not find phosphorus in a large amount. We need only the **force of phosphorus, not the substance.**

Valerian is the only vegetable addition to our compost heap which has not to be specially prepared. We use the **flowers** for this purpose. After putting them into lukewarm rainwater we squeeze them out, or better still, we put the flowers in a glass bottle of rainwater, keep it in the sunshine for several days (well stoppered, so that no odour escapes) then we squeeze the juice from the flowers. This concentrated tincture can be kept a long time. When the compost heap is finished (see Chapter IX) and covered with soil, and all the other preparations have been inserted, we sprinkle valerian in a high dilution over the heap. The right degree of dilution is the *7th or 8th potency,* according to our experiments.

(2.) Experiments with Valerian

To find the right dilution we made our usual series of 60 potencies with wheat plants and obtained the following result:

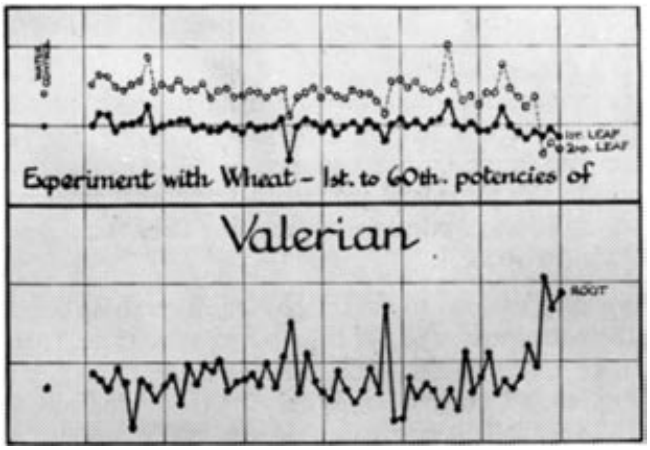


Fig. 241 Wheat grown under the influence of 1st - 60th potencies of valerian

This is a very clear graph, which indicates as first maximum the 8th potency for the first and second leaf, and the 6th potency for the roots. **That is the potency we need for the treatment of the compost or manure heap.**

Then the first minimum, equally clear for the first and second leaf and root, happens at the 26th potency, the second minimum which is stronger for the root growth than for the leaves happens at the 38th potency.

The second maximum for the roots is the 39th and 40th potencies; for the leaves the 46th; and a smaller one at the 53rd potency.

The third minimum for the leaves and roots is the 58th potency.

Equally interesting is the graph we get for the weight:

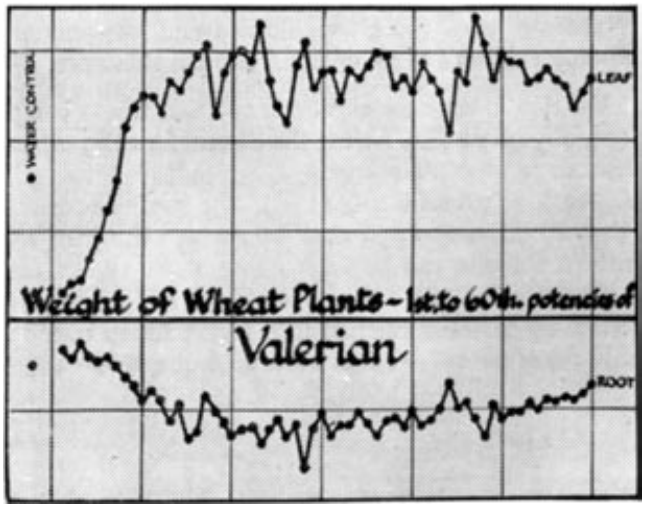


Fig. 242 Weight of Wheat plants grown under the influence of 1st-60th potencies of valerian

It is amazing how **heavy** the plants are relatively, if we compare them with the weight of wheat plants which have not been treated with valerian. We find a maximum weight at the 23rd potency and the 47th potency. The first minimum is at the 18th the second at the 26th and the third at the 44th potencies. The roots have two minima at the 17th and 44th potencies. The maximum appears at the 28th potency. We find here the same phenomenon that we found after the treatment with milfoil prepared in the stag's bladder, that the higher potencies help the plant to put on weight. **This cannot be explained as a material influence.**

(3.) Tests with Capillary Dynamolysis

We also studied the formative forces hidden in the watery extract of the flowers. The fresh extract has an immense power to form, with the help of silver nitrate and also with other metal salts like gold chloride, copper sulphate, iron sulphate, etc. We reproduce a few of these experiments.

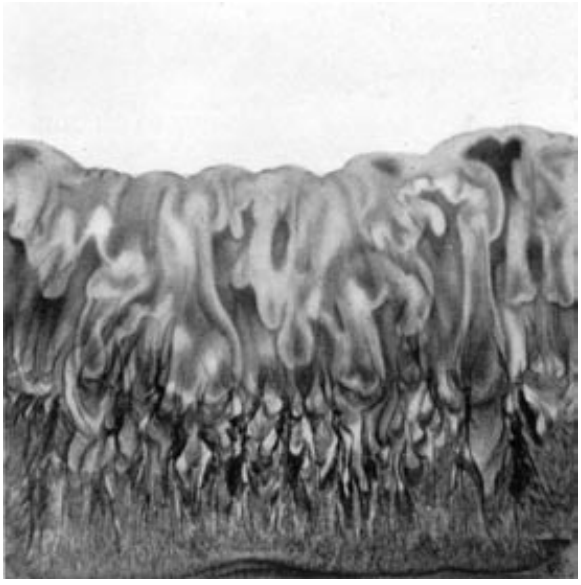


Fig. 243 Extract of valerian flowers with rainwater followed by 1% silver nitrate

It is exciting to watch these pictures grow. Half an hour after the silver solution has been added, many forms are already in process of forming. It is scarcely credible that out of the slightly yellow filter paper, impregnated with the juice of valerian, the silver nitrate makes those beautiful forms emerge. They are of vivid light and dark brown colours. This experiment has been carried out in Holland with valerian collected and extracted in Holland on the experimental farm of Mrs. Menten.

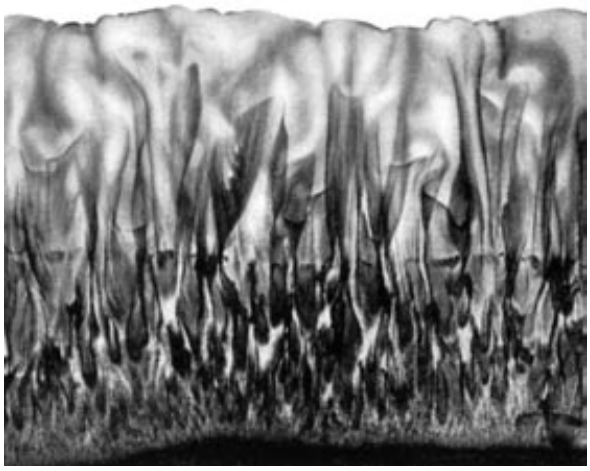


Fig. 244 Extract of valerian flowers with rainwater followed by 1% silver nitrate

The experiment shown in Fig. 244 is part of a series carried out in England. The valerian was collected in England. If we compare these two experiments we come to the conclusion that the Dutch valerian was more effective.

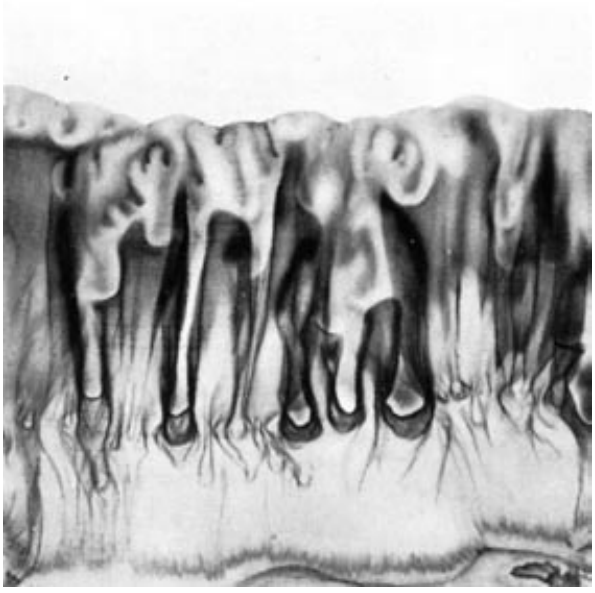


Fig. 245 Extract of valerian flowers with rainwater followed by 1% gold chloride (Dutch)

Also with gold chloride the valerian produces powerful forms. Not every plant can do this. The colours at the top of the picture are a thin purple border line, then light green and yellow, surrounded by a dark purple contour, and at the bottom bluish purple.

Fig. 246 Extract of valerian flowers with rainwater followed by 2% copper sulphate

Fig. 247 Extract of valerian flowers with rainwater followed by 1% tin chloride

This too, is a rare event that such powerful forms can be created by plant juice, together with copper sulphate, or tin chloride. We regret that we cannot produce the whole series, because each one of these pictures is different and interesting to study.

It is quite obvious from all these experiments, that in the extract of valerian we have a very powerful substance which, for a plant, has an unusual capacity of form production.

If we dilute valerian and sprinkle it over the manure or compost heap we have a powerful aid in the vitalizing process and digestion of the manure.

The Capillary Dynamolysis reveals part of the forces hidden in valerian. We find another part if we keep an extract for a longer period. We had some huge glass jars stored on top of a cupboard in our laboratory at Stuttgart. The glass stoppers fitted tightly into the jars. After some time we noticed that the juice was working, and there was a noticeable development of gas. One day when we entered the room there were glass splinters and valerian scattered everywhere. One huge jar had burst into thousands of pieces. Such an immense force can be produced by valerian in its fermentation. We were able to rescue the rest of the jars by lifting the stoppers for a little while. Then the fermentation died down again. Strange to say, a year later, it happened again. We were so sure that nothing would happen – that we had to undergo the same experience and paid for it with another burst jar, and two others threw out their stoppers and were partly cracked. Again the process died down. The third year the juice again began to work and develop gas. This time we were sufficiently warned and lifted the stoppers in time.

The second time it happened during the night, and we were still working in the room. It was like a real explosion and one of our collaborators, who worked two storeys below heard it and came up, to see what had happened. This explosive power is hidden in valerian.

We had kept the juice all this time because we wanted to find out, how long it may be stored for use. In 1939 we compared fresh juice here in England, and some extract which was only one

year old, with our ten-year-old preparation. The latter was still effective. Of course there is no actual need to keeps it such a long time. It is best to use the fresh extract.

Some practical hints on how to make the 8th potency:
We collect as many flowers as we can find, put them in a jar and add rainwater. We place this jar somewhere in the sun, and put a lid or stopper on it, so that the perfume does not evaporate into the air. After a few days we notice that the water has become brown. We press the liquid from the plants as much as possible. We must have a dark brown and strong-smelling extract. We take one part of it and add 9 parts of water (for instance 1 ounce extract and 9 ounces water). It is best to use rainwater. We fill a clean bottle with this mixture and shake it vigorously for about five minutes. Then we have our 1st potency. Now we need seven more bottles, and we repeat this process seven more times, always taking 1 part of the finished potency and adding 9 parts of fresh rainwater, shaking for five minutes. It is best to have eight bottles and to put a label on each, indicating the potency. The last bottle can be used for sprinkling over the compost heap. If we have two or more compost heaps we use our other bottles. From the 7th potency we can make nine more bottles of the 8th potency, always using one part of the 7th potency, adding 9 parts of fresh rainwater. Should it happen that we have used up the 7th potency and still want to sprinkle more manure heaps, then we use the 6th potency. From this bottle we first make one fresh bottle of the 7th potency, and then we can go on making 9 bottles of the 8th potency. It is a very cheap and a very economical way of treating the manure; it is much more economical than the artificial fertilizers and is a healthy way too. It does not even take much time. To make the first 8 potencies we need about one hour, if we shake each potency five minutes.

Chapter IX.
THE TREATMENT OF MANURE AND COMPOST.

(1.) Introduction.
(2.) Experiments with manure treated according to Dr. Steiner's suggestions:
(1.) Extract from a **manure heap** (Holland) after two and a half months preparation.
(2.) Capillary dynamolytical test of the same extract followed by 1% gold chloride.
(3.) Extract from a **compost heap** (Holland) after only 12 days preparation.
(4.) Capillary dynamolytical test of the same extract followed by 1 % gold chloride.
Experiments with **liquid manure**:
(5.) Prepared sewage (Holland).
(6.) Capillary dynamolytical test with the same substance followed by 1% gold chloride.
(7.) Similar experiment.
(8.) Prepared liquid manure from various organic refuse followed by 1% gold chloride.
(9.) Prepared liquid manure from various organic refuse followed by 1% silver nitrate.
Treatment of **compost heaps**:
(10.) Extract of prepared compost heap (Holland) followed by 1% gold chloride.
(11.) Extract of prepared compost heap (England) followed by 1% gold chloride.

(1.) Introduction

We have mentioned already in previous chapters, that the making of a good manure, or compost heap, is a great art. What we want in agriculture is **life** in the soil for the plants, that is to say humus. It takes a long time for manure to rot and become **humus**, and very often during this time many valuable substances are lost; some evaporate into the air, some are washed away by the rain, some are bleached out by the sun. These losses can easily be prevented by covering the manure heap with soil. If we start a new heap, we first dig out some of the soil, about 6 to 8 inches, and keep the soil near by to cover the heap with it later on. It is good to have the heap in close contact with the soil; it should be taken into the inner breathing process of the earth, and this contact is enhanced by digging out a few inches, so that the heap reaches below the surface of the soil. The heap should be firmly trodden down; and always covered with some suitable material, until it is high enough to cover with the soil that was dug out at the beginning. The thickness of the cover is determined by the quality of the soil. A very heavy soil (clay) has to be put on in a thin layer. The manure heap has to breathe, and the covering layer should not hinder this process. Fig. 248 shows the finished, well-covered manure heap.

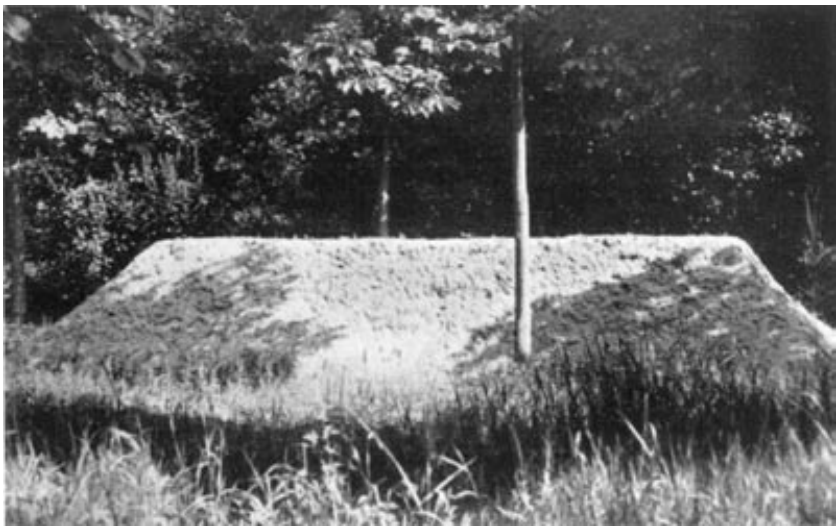


Fig. 248 Finished and covered manure heap ready to be prepared

The described preparations have to be inserted into it:

Camomile =C **Oak bark=O**

Dandelion=D **Stinging nettle=N**

Milfoil=M

We make five holes with a wooden stick, one at each comes and one in the middle of the heap. The preparation should be inserted in them at least 10 inches deep. It is best to have the milfoil preparation in the middle and the other four preparations in the four corners.

If the compost heap is longer, the following arrangement can be made:

N C N

M M

D O D

This allows an equal distribution of the radiating forces inside the heap.

The manure must be closely in contact with the preparations, and so must be well covered again with the manure and the layer of earth on the top. After all this has been completed, the last preparation, valerian is added. As described in Chapter VII it is best to use the 8th potency of valerian, and sprinkle this over the heap. The potencies should be made with lukewarm rainwater.

These preparations begin to act and produce the right fermentation in the manure or compost heap. Not more than 1 or 2 grams of each of these preparations should be inserted. The manure is quickly transformed. Two to three months are sufficient to impregnate stable manure with the radiating energies of the preparations. The farmer can convince himself of their value by

observing the blackish-brown substance into which the manure is changed, and which is rich in humus, and microorganisms, that thrive lustily in it; and it seems that all the earthworms of the neighbourhood have chosen it for a rendezvous. Life streams out of the heap; life is put back into the soil. We need less of this manure for the enlivening of the soil than we need of a carelessly treated, badly rotted dung.

(2.) Experiments with manure treated according to Dr. Steiner's suggestions

We refer to Chapter I in which we demonstrated the difference between cow manure one year old and cow manure buried in the cow-horn during wintertime beneath the surface of the soil. Fig. 182 is representative for untreated manure. If we make a test with our capillary dynamolysis we get similar, more or less chaotic, dark purple pictures. Therefore, we always turn back to this typical picture for comparison. On the 22nd February, 1939, we inserted our own preparations into some manure heaps in Holland on the farm of Mrs. M., who had asked us for help in establishing a farm according to Rudolf Steiner's principles. On 11th May, 1939, after two and a half months, we made our capillary dynamolytical test with manure from this heap. We took samples from various parts of it. One gram of the manure was dissolved in 10 c.c. of warm rainwater and after two days' extraction a series of filter-paper pictures was made. The slightly yellow liquid did not rise very high, and produced a slightly yellow border line (Fig. 249).

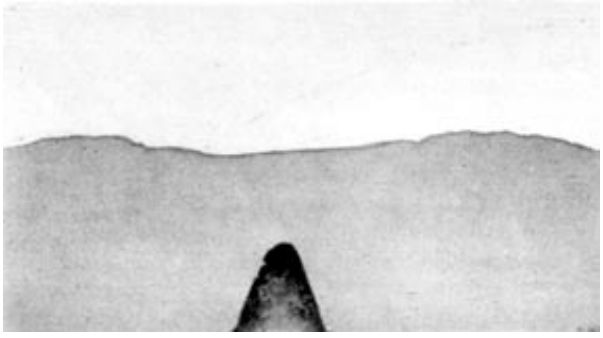


Fig. 249 Extract from a manure heap taken on the 11th May, 1939, prepared on the 22nd February, 1939

We add the different metal salt solutions, and choose as most characteristic the test with gold chloride, which has to be compared with the untreated manure picture shown in Fig. 182, Chapter I.

We believe that everybody, even without much experience in our method, will get a certain impression of the radiating forces which stream through this picture, and tell us that the preparation has been highly effective and has endowed the manure heap with a great vitalizing force.

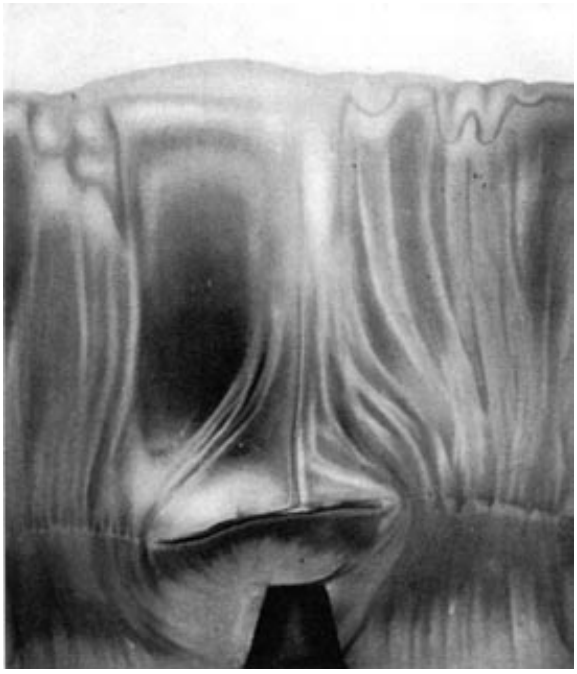


Fig. 250 Sample taken from the above-mentioned prepared manure heap, followed by 1 % gold chloride

Another test was made with a very recently prepared manure heap The preparations were inserted on 2nd May, the test made on 13th May, when the preparations had acted barely a fortnight.

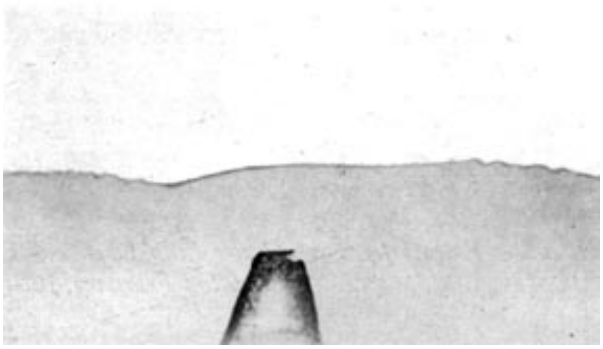


Fig. 251 Extract of the prepared heap (2nd-13th May, 1939)

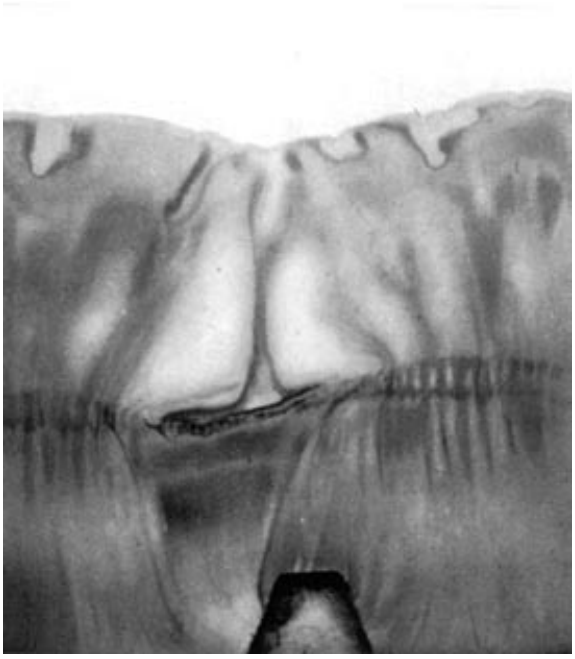


Fig. 252 Extract of the prepared heap (2nd-13th May, 1939), followed by 1% gold chloride

The similarity is very striking, and without any doubt due to the inserted preparations.

Liquid Manure

One of the greatest wastes we find in agriculture, is the careless way in which liquid manure is treated. Many farmers just let it run away, and a marvellous help for farming and gardening is lost.

Liquid manure can also be treated with our preparations, and transformed into a first-class fertilizer which costs next to nothing. If a farmer has made appropriate arrangements for collecting the sewage, the preparation can be made as follows. Two pieces of wood are nailed together in the form of a cross, the preparations are placed in small muslin bags, weighted down with a small stone (of course not so heavy that the muslin bag breaks), the bags are fixed with a 20-inch long thread on the corners and the middle of the cross. The wooden cross, carrying the five preparations, floats on the surface, and radiates its forces into the sewage. We show some tests with sewage treated in the manner described.

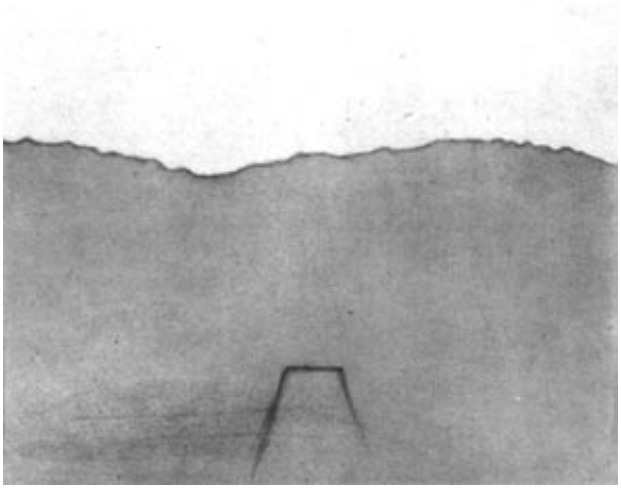


Fig. 253 Prepared sewage rising in filter paper

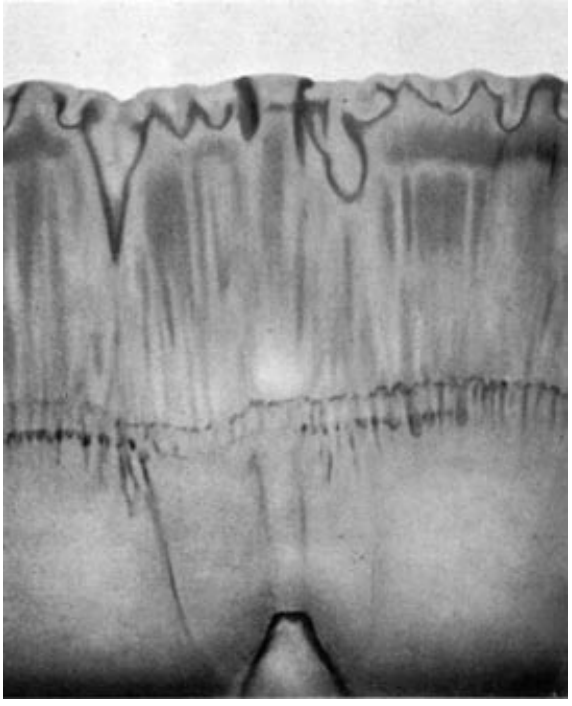


Fig. 254 Prepared sewage followed by 1% gold chloride

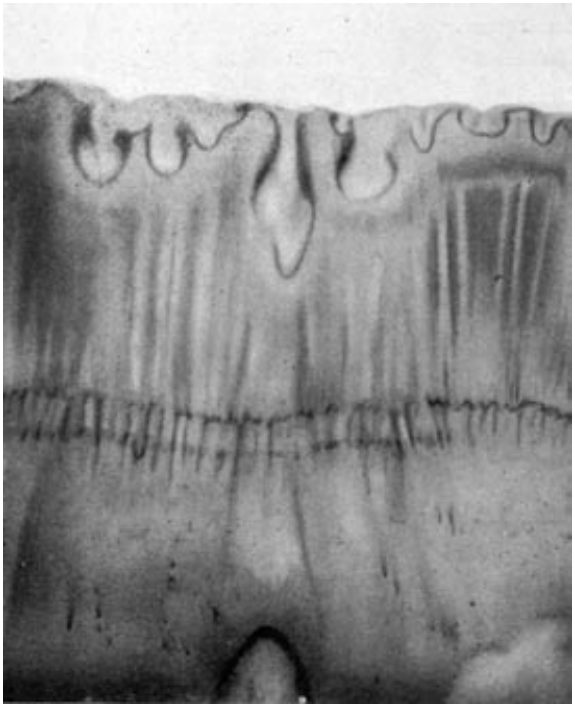


Fig. 255 Prepared, sewage followed by 1% gold chloride

These tests reveal a good penetration of the sewage with the harmonizing and vitalizing activity of our preparations.

Another valuable help which the gardener could have, even on a small scale, is a wooden barrel, or several wooden barrels containing organic waste products. Poultry-keepers could use some of their poultry manure, pulverized egg shells, bone meal or horn meal and similar organic waste which can easily be obtained; or perhaps some cow manure can be added. All these are mixed in the barrel which may be kept near the manure or compost heap. It would be still better to dig the barrel partly into the soil, and partly cover it up with soil (Fig. 256), fill it with rainwater, and cover it. Then five hooks are fixed in the lid and the preparations hung in muslin bags on these hooks, so that they are suspended about fifteen inches in the liquid. After two to three months a first-class fertilizer for the vegetable and flower garden is ready.

Fig. 256 Barrels partly dug into the soil containing various organic refuse

After two months we make the Capillary Dynamolytical Test with the following result:

Fig. 257 Prepared liquid manure from various organic refuse, followed by 1 % gold chloride

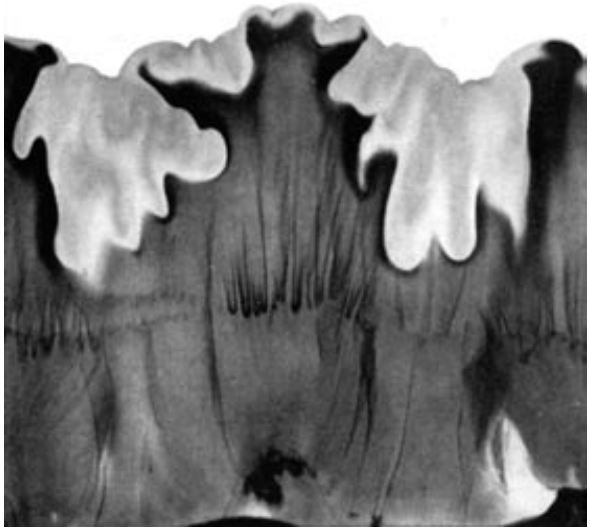


Fig. 258 Prepared liquid manure from various organic refuse, followed by 1% silver nitrate

Treatment of Compost Heaps

Every garden can have a compost heap if we use lawn cuttings, vegetable refuse, kitchen refuse, and so on. We build it up like the manure heap, at first digging out some of the soil for covering up the heap later on. This differs only in one respect from the manure heap: Rudolf Steiner suggests having small layers of quicklime alternating between the layers of vegetable refuse, each layer trodden firmly down. The finished heap is covered with the soil, and prepared as the manure heap is. The process is quickened if between we add some good soil. Of course it takes longer for the compost to rot, and be transformed into a substance rich in humus, than is the case with stable manure. It depends entirely on the refuse we put into the compost heap as to how long it takes to ripen. It is best to turn the compost heap after half a year; then of course the lime gets mixed with the vegetable refuse, and there are no separate layers. If necessary the preparations may be added once more.

We may put all weeds into the compost heap, but they should be in the inner part of it. In about a year the compost is ripe; decomposition, with the help of the preparations, is complete. It smells beautifully, and again we find that it has a great attraction for the earthworms.

Experiment to test the quality of the Prepared Compost Heap

We use the method of Capillary Dynamolysis. At first we dissolve 1 gram of the compost taken from the middle of the heap, dissolve it in 10 c.c. rainwater, then let the liquid rise into the filter paper afterwards followed by 1% gold chloride.

The test looks very similar to our prepared manure heap and is an excellent fertilizer for the garden.

Fig. 259 Prepared compost heap (1 year old) extract followed. by 1% gold chloride

Another test carried out with a compost heap prepared by Mrs. Howard Pease in the Old Mill House, Bray, Berks.

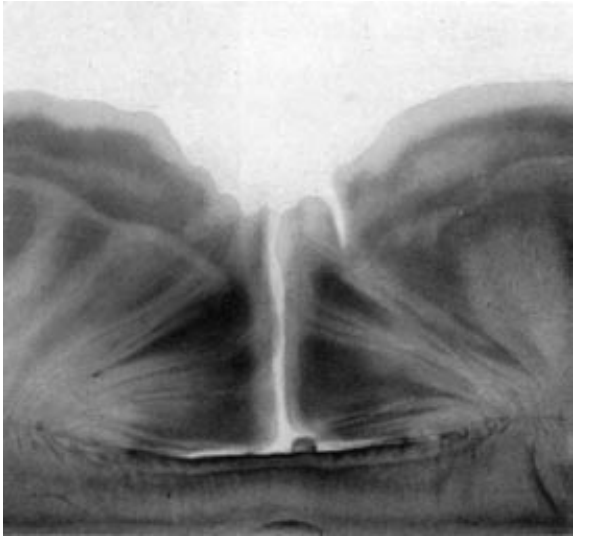


Fig. 260 Prepared compost heap extract followed by 1% gold chloride

This method enables us to judge very quickly the value of any manure or compost heap, or any other fertilizer. We will give a few more examples. Some of them are very negative, but we learn to appreciate the positive things even more, if we observe the negative things too.

Chapter X.
Experiments with Peat-moss, Hop Manure, Dried Blood, Artificial Fertilizer "G", Fertilizer produced with the help of a specific bacterium

(1.) Capillary dynamolytical test with peat-moss.
(2.) Similar experiment with hop manure.
(3.) Similar experiment with dried blood.
(4.) Similar experiment with artificial fertilizer "G".
(5.) Similar experiment with fertilizer produced with the help of bacteria.
(6.) Homoeopathic effect of the artificial fertilizer "G" on the growth of wheat plants grown under the influence of the 1st-60th potencies.
(7.) The same experiment carried out with the fertilizer produced with the help of a specific bacterium.

For instance, we may ask whether peat-moss is a good fertilizer?

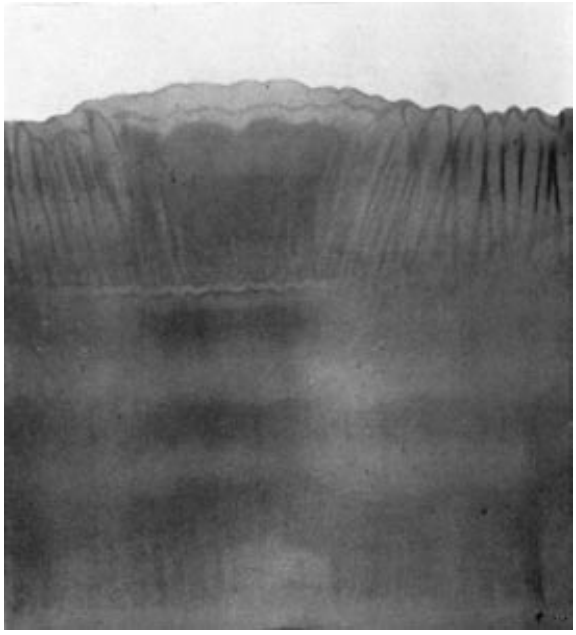
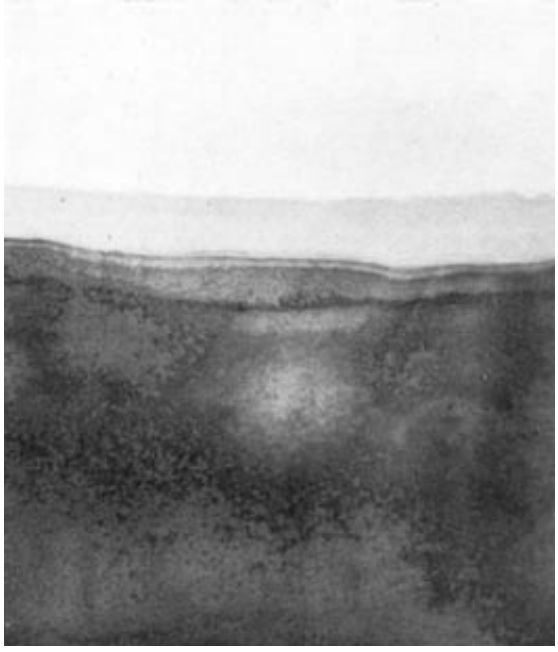


Fig. 261 Capillary Dynamolytical test of peat-moss (1% extract), followed by 1% gold chloride

The test says: "No". There is scarcely any life left in peat-moss.

We ask again: is Hop Manure good as a fertilizer?
The test reveals that hop manure is better than peat-moss, but there is not enough life in it to enable it to act as a really vitalizing force for the soil.

Fig. 262 Capillary Dynamolytical test with hop manure followed by 1% gold chloride



What about "dried blood "?
The test says definitely "No". There is no life m this "fertilizer"; the gold has become brown and dirty, and looks "burnt" to death.

Fig. 263 Capillary Dynamolytical test with "dried blood" followed by 1% gold chloride

There is another well-known preparation which is much advertised for smallholders, and many people buy it. We will call it "G". There is a long description on the package promising all the good things possible for the vegetable garden.

We try it:

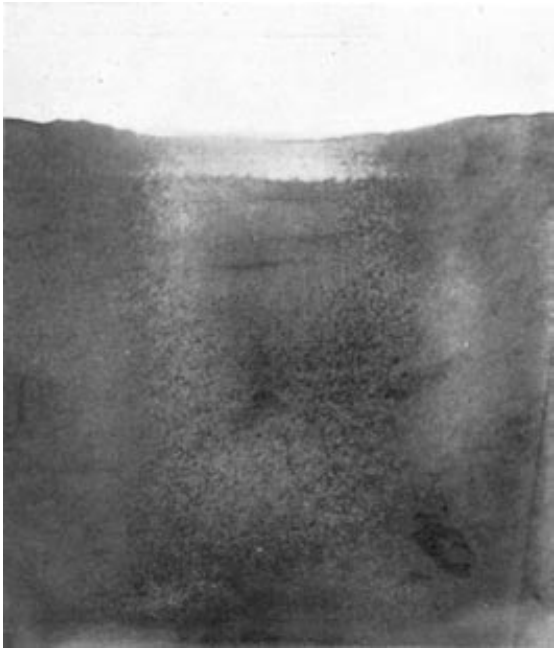


Fig. 264 Artificial fertilizer "G" 1% extract followed by 1% gold chloride

We need only compare such an experiment with the prepared cow manure, or even the unprepared cow manure, to see immediately that this "fertilizer" cannot be of value to the soil.

Once we had a long talk with some English scientists, who were convinced that they had found the solution to the fertilizer problem. We were told of a marvellous method for converting every kind of town rubbish, really everything, organic or inorganic, into a good fertilizer. The process is quick, and is done by a specific bacterium which produces heat. We were told so much – the rest was a secret. The preparation was cheap; it could be used in large quantities and the practical results were good. We asked for a sample and received it immediately. The substance looked grey, and smelt like ash. It was a fine dust-like powder, a perfectly dead material to the touch – not to be compared with real plant compost. Still the scientists assured me that it was a good compost. We tried with Capillary Dynamolysis:

Fig. 265 Fertilizer produced with the help of a specific bacterium, followed by 1% gold chloride

There is no need to say much about this fertilizer either. It is dead and cannot make the soil alive. So what is the use of it? Even if it is cheap? However, we do not want to be unfair to these artificial fertilizers, so we also make the experiments with potentizing from the 1st to the 60th potencies.

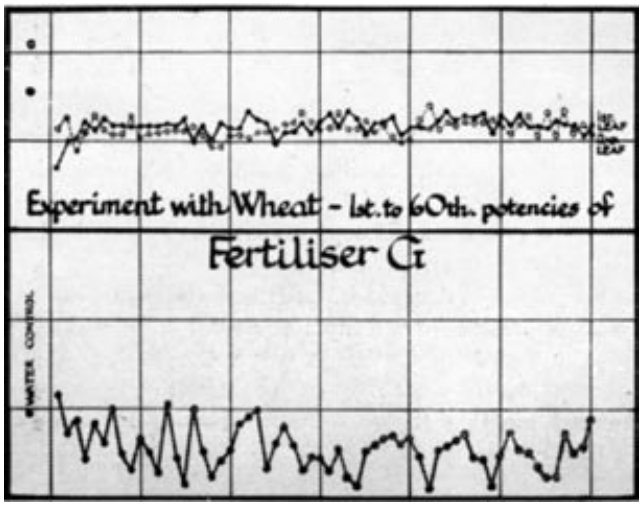


Fig. 266 Wheat plants grown under the influence of the 1st-60h potencies of the fertilizer "G "

The leaves are very tiny. The experiment was carried out in the month of July, and the wheat plants should at least be twice as long. It is evident, that the "fertilizer" has retarded the growth of the leaves. Furthermore the first and second leaf are so entangled that we can scarcely distinguish the two graphs.

The root development is much better, but it is very difficult to decide about maximum and minimum growth.

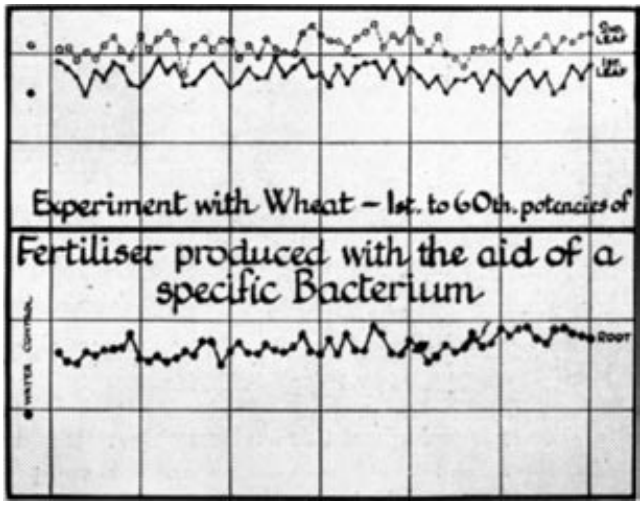


Fig. 267 Wheat plants grown under the influence of 1st-60th potencies of the compost gained with the help of bacteria

There it is the opposite way round. The leaves are quite good, and the roots are small. First and second leaves are easily distinguishable. But here also it is difficult to decide about a maximum or minimum growth.

How does a soil change if for some years it is subjected to the treatment described in the previous chapters?

Chapter XI.
Capillary Dynamolytical Tests of untreated and treated soil

(1.) Capillary dynamolytical test of soil.

(2.) Capillary dynamolytical test of soil having been treated for three years according to Rudolf Steiner's suggestions.

Before starting the treatment we examined soil taken from various places by means of Capillary Dynamolysis. The best result we obtained is shown in Fig. 268.

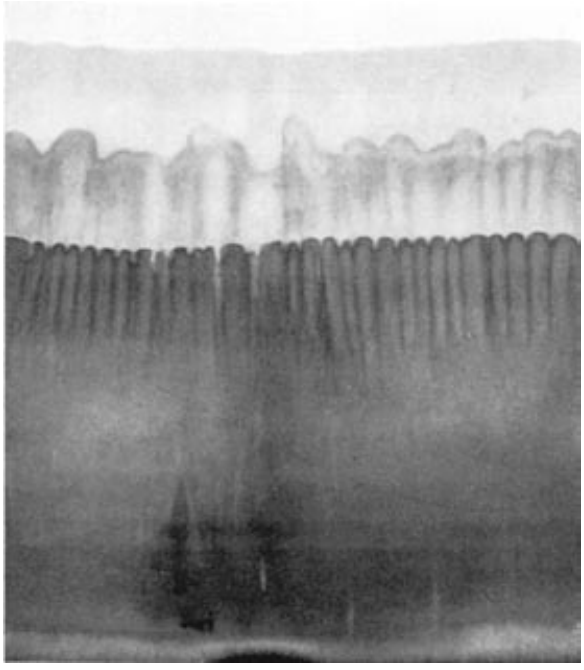


Fig. 268 Soil test before the treatment followed by 1% gold chloride

Three years later we examined again and found the following results:

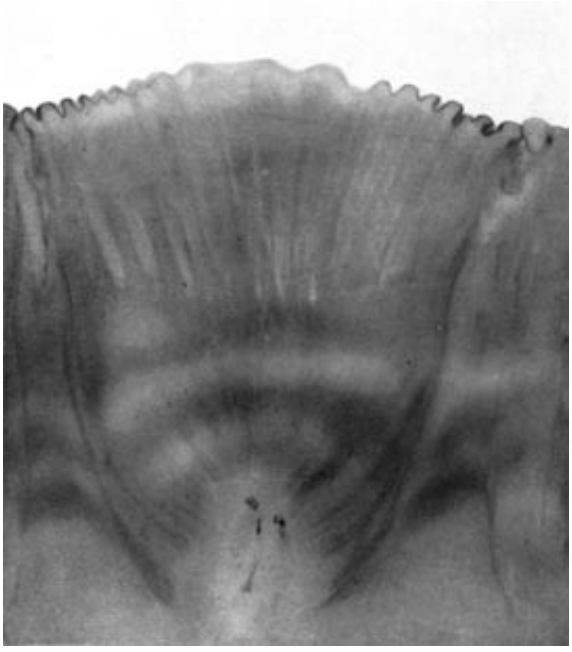


Fig. 269 Soil test with 1% gold chloride after three years' treatment according to Rudolf Steiner's suggestions

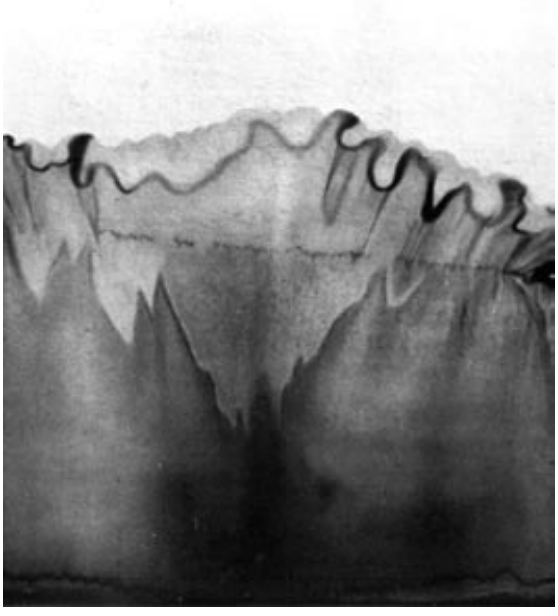


Fig. 270 Soil test with 1% silver nitrate after three years' treatment according to Rudolf Steiner's suggestions

The soil has undergone a change which convinced us of the great advantage this method produces, if faithfully applied in all details

Chapter XII.
BRIEF RESUME OF THE PREPARATIONS SUGGESTED BY RUDOLF STEINER FOR A RENEWAL OF AGRICULTURE.

Silica

(1.) Pure Silica Sand (pulverized rock crystal) – kept in cow-horn, during summer buried in the soil. Later on applied in homoeopathic doses as a spray, helps a soil lacking in silica (see Part II, Chapter VIII).

(2.) Dandelion – treated as described in Part III, Chapter IV, has the faculty of regulating the relation between silicic acid and potassium in the plant organism. Used in homoeopathic doses as addition to manure or compost heaps.

(3.) Equisetum – a plant containing in its life process an enormous amount of silica (see Part II, Chapter IX) used as remedy for plant diseases, in cases where plants are attacked by different insect pests due to a wrong composition of the soil. See details in the Chapter: Equisetum arvense as a remedy for different plant diseases.

Calcium

(1.) Quicklime – mixed into compost heaps in small quantities (see Part III, Chapter IX).

(2.) Used in homoeopathic doses as a spray on soil lacking calcium (see Part II, Chapter XII).

(3.) Oak bark – treated as described in Part III, Chapter III, acts in a prophylactic way against plant diseases. It is used in homoeopathic doses as addition to compost and manure heaps.

Sulphur

(1.) Camomile – (see Part III, Chapter V). The camomile plant has a certain relation to the sulphur process which enables it to regulate the consumption of calcium. Added in homoeopathic doses to the manure or compost heap.

(2.) Milfoil – (see Part III, Chapter VI). This plant also is related to the sulphur process. We even find some traces of sulphur in the roots. Milfoil has the capacity of regulating the potassium metabolism in plant life with the help of the sulphur process.

Phosphorus

Valerian – (see Part III, Chapter VIII) helps the manure to find the right relation to the phosphorous substances in the surroundings. Used in homoeopathic doses as addition to the manure and compost heap.

Iron

Stinging nettle – (see Part III, Chapter VII). This plant regulates the iron household in Nature. If the soil contains too much iron we should plant stinging nettles. They attract the superfluous iron. Added in homoeopathic doses to manure and compost heaps. Helps to regulate the nitrogen content.

Concentrated Cow Manure

Cow Manure – see Chapter I, used as a spray in homoeopathic doses to enliven the soil.

Chapter XIII – Weeds

It is difficult to define what a weed really is. In some books we find the following definition: A weed is a plant that grows in a place where we do not like it to grow.

That is a very simple definition – but not a good one. Very much the contrary. Many plants which we consider weeds are excellent remedies. A large proportion of the preparations we add to the compost heaps are so called "weeds", such as dandelion, nettle, horsetail, milfoil. At the same time they are very powerful remedies. We must be very careful in using this expression. On the other hand it is perfectly true that we do not like the dandelion growing everywhere in our gardens. The main question is: how can we restrict the growth of dandelion, or nettle, or milfoil, or whatever plant it may be, that has the tendency to grow too abundantly for our needs?

We must bring something into the soil that the weeds do not like. It is very simple but effective advice that Rudolf Steiner gives us. The power to reproduce new plants is concentrated in the seeds. **We burn the seeds** of those weeds which we want to restrict in their growth, collect the ash, and scatter it over the field. That is again an action of smallest entities. We do not need a great quantity of seeds. The ash radiates out over a large area, counteracting the reproductive force the seeds contain.

We carried out experiments, for instance, with seeds of **thistles**. After two years we still found thistles growing on the spot where we had used the preparation of burnt thistle seeds. The plants looked quite healthy, but when the seeds began to ripen, we noticed that they began to deteriorate. In the third year the thistles were very scarce, and after four years' treatment they disappeared completely from the treated area.

Nearly all our experiments with weeds have shown us first the phenomenon of seed-deterioration, and then the plant no longer grew in the treated district. But the whole process takes about four years, and each year the treatment has to be repeated.

This again is a very economical and healthy way of disposing of unwanted plants. We do not need chemicals which damage the soil or poisons to kill the weeds. The most natural thing is done: **we combat the plant with the counter force of the same plant.**

Some practical hints for making these preparations:

The seeds of all the different weeds we want to get rid of are first collected. Of course they must be quite ripe. Then they are burnt in the open on a small heap of wood, the remaining ashes are collected (wood ash plus burnt seeds) mixed in a mortar with a pestle or some other suitable tool, and then the ash is scattered over the field.

Or we can burn the seeds in a frying-pan and get only the ash of the seeds without the burnt wood. In order to distribute the ash over the required area, we take some potting sand, or soil from the field, and rub it together with the burnt seeds very carefully, as was described in the chapter on "Smallest Entities", for remedies which are insoluble in water and are potentized with the help of a neutral medium like lactic sugar. So we potentize the burnt seeds with the soil, and scatter this potency over the field in which the weeds are growing. Every farmer and gardener can easily make these preparations. They do not cost a single penny, and definitely help him to get rid of unwanted plants.

Chapter XIV.
Destruction of Insects, Field Mice and Slugs

How to abolish Insects

To dispose of insects, something similar is done as for weeds. We collect the insects, for instance rose beetles (but this applies to all insects) and burn the whole insect during a certain constellation. The insect world has to be studied in connection with the course of the Sun through the zodiac. The sun acts differently if it stands in Leo, or Virgo, or Libra; different forces stream down upon earth and enter plant and animal life. We must use the right forces of the sun when burning the insects (Sun in Taurus) so that the ash counteracts the life process of the special insect we want to destroy.

The Moon and Water are a unity – as we explained in the chapter dealing with the influence of the moon on plant growth. We use their forces to help plant growth. **Fire destroys fertility.** The radiating force of the burnt seeds makes it undesirable for the plants to grow in that place; the ash of the burnt insect radiates into the surrounding soil, and the insect does not like to live in an area whence there streams out the counter force to its own life force, its power of reproduction.

How to get rid of the Fieldmouse

It is very annoying for the farmer if part of his crop is destroyed by mice. Many things have been tried for killing mice, many poisons have been used, yet all these experiments are unsuccessful. The mice come again and again.

Dr. Steiner gives strange advice. We have to look for a certain constellation of the planet **Venus**, collect the skins of mice during this time, and burn them. If we scatter these ashes over the field the mice will disappear. It is not necessary to burn the whole mouse, we only need burn the skin.

How can we verify such assertions? They seem so very strange to us. Our first experiment carried out in 1926 will be described. We began by breeding a large number of white mice in order to carry out the necessary experiment during the constellation of Venus. The mice were kept in glass cages covered with wire mesh in a 'separate room, well equipped for this purpose. Each cage contained a male and a female mouse.

The day of the constellation came, the exact hour for the experiment was fixed for four o'clock in the afternoon. We examined the mice every other hour, and found everything in complete order. At two o'clock in the afternoon we examined them for the last time, when feeding them. Some minutes before four o'clock we entered the room again and had a real shock. In each of the cages one mouse was killed. **The female Mouse had killed the male.** In all the cages there was the same ghastly spectacle. The killing was done so, that the female mouse had bitten through the throat of the male, then opened the skull and begun to eat the brain. Some mice must have started earlier or worked more quickly, because we found different stages of this terrible process. In a few cages the female mouse was sitting quietly beside the victim, looking innocent, as if everything was all right. Some mice had apparently first eaten the brain, and then started to eat the other inner organs, beginning with the lungs and working downwards to liver and kidneys. Some stopped after having eaten the brain – they had bitten off the four paws and placed them symmetrically in a square in the sawdust.

We shall never forget this spectacle. Probably we had not fixed the right moment for our experiment. The planet Venus came to the highest effectiveness earlier than we presumed and the female mice acted under this influence. No other explanation was possible. The constellation of Venus had driven the female mice to kill their mates m this extraordinary way.

Rudolf Steiner really knew about all these forces, how they work in the plants, in the animals and in the human organism. All his indications are correct. If we burn the seeds of the plants we interfere with the forces of reproduction in plant life. If we burn the whole insect, we interfere with the reproduction in animal life, but then we must take the sun into consideration. The sun must stand at a certain place in the zodiac. If we burn the skins of higher animals, we again interfere with the force of reproduction – then we must see that the planet Venus stands in a certain constellation. That we are interfering with the forces of reproduction is quite obvious from the fact that the female mouse killed the male.

We may recall here the fact that a similar phenomenon has been observed with certain spiders. Immediately after the mating has taken place, the female spider kills the male and eats it.

Or the bees kill the males after the queen has been fructified. The mice killed their mates when the planet Venus came into a certain constellation.

Such a knowledge is an immense weapon in the fight against different higher animals which do damage in agriculture. But it also places a great responsibility on those who use this knowledge.

Report of a similar Incident

About a year later we had a visit from a young farmer who had tried to get rid of his fieldmice according to Rudolf Steiner's suggestions. He kept seven mice in a cage on the field, and when the time came to make the preparation, he found only one mouse left. It was a great pity that he did not observe whether the mouse which was left was male or female. We presume it was the female mouse who had killed and eaten the others, which must have been males.

The use of the mouse preparation is limited. The radius of action is fairly large, but if, for instance, a smallholder uses such a preparation, and he is surrounded by neighbours who do not use the same, he will never completely get rid of the mice. They will withdraw to the neighbour's land unless he also can be persuaded to use the remedy.

Slugs

If young leaves in vegetable gardens are eaten by slugs, we make them unpalatable for them by spraying the plants with an extract of the seeds of Picea excelsa.

Three grams of the seeds are crushed to a fine powder in a mortar, then we add slowly lukewarm water, stirring incessantly at first to a thick pulp, then to a thin pulp; we then put it into a bottle and add lukewarm rainwater until we have 1 litre= 1, 000 c.c. Shake the bottle vigorously for about five minutes and then place it in the sunshine. From time to time we shake again. This emulsion is sprayed over the plants and soon the slugs disappear.

Chapter XV. Regeneration of Potatoes

It is a well-known fact that many plants are degenerating through modern methods of cultivation, and then diseases begin. For instance, such plants as potatoes often show signs of degeneration due to wrong manuring, maltreated soil, etc.

For the regeneration of potatoes Rudolf Steiner suggested cutting out carefully a single eye with a tiny amount of potato substance adherent to it. The new plant therefore does not get much nourishment from the degenerated mother plant. The next year this process is repeated. From the new potatoes grown out of the single eye, we again cut out a single eye and plant it. Thus we get good regenerated potatoes.

We have tried this experiment with the following result:

First Year:

First series: planted two days before Full Moon	
Average weight for each row	21.0 lb.
Average weight for each row, single eyes	9.5 lb.
Second series: planted two days before New Moon	
Average weight for each row	17.0 lb.
Average weight for each row, single eyes	6.0 lb.

The potatoes looked quite healthy which were grown from the single eyes, but they were much smaller than the other series.

Second Year:

First series: planted two days before Full Moon	
Average weight for each row	24 lb.
Average weight for each row, single eyes	14 lb.
Cut from last year's single eyes	38 lb.
Second series: planted two days before New Moon	
Average weight for each row	20.5 lb.
Average weight for each row, single eyes	8.0 lb.
Cut from last year's single eyes	26.0 lb.

The potatoes we harvested after the second treatment, that means potatoes raised again out of a single eye of a potato which had already been once treated in this way, had the normal big size, looked healthy, and tasted much better. So we strongly recommend regenerating potatoes by this simple method. Of course it would not be very useful to regenerate potatoes, if the whole wrong, system of manuring with artificial fertilizers, is not also changed.

Chapter XVI.
THE FORMATIVE FORCES OF VARIOUS SUGARS, HONEY AND SACCHARIN, STUDIED WITH CAPILLARY DYNAMOLYSIS.

Many years ago we started to study various sugars, to compare them with various kinds of honey. We do not intend to embark on a detailed discussion of these complicated problems and wish only to go far enough to make understandable very valuable advice which Dr. Steiner gives in regard to feeding bees with sugar.

We apply the term "carbohydrates" to a class of compounds which are either sugars, or can readily be converted into them by hydrolysis. They contain only **carbon** together with oxygen and hydrogen in the right proportion to form water. We discriminate between Monosaccharides (Glucose, Fructose);

Disaccharides (cane sugar, maltose, lactose); polysaccharides (cellulose, starch).

Glucose, a very important sugar, occurs together with fructose in various fruits and kinds of honey. Glucose has been synthesised and is manufactured on a large scale for use in numerous industries as a substitute for cane sugar. The source of glucose is starch, either of potatoes, rice or maize, which is heated under pressure. Then 1% sulphuric acid is added, and later again chalk to neutralise the acid. Calcium sulphate is formed which can be filtered off. Still further on the glucose may be decolourised by charcoal, and concentrated in vacuum pans. It may be used in the form of the moist crystalline mass (e.g., maize syrup) or it may be recrystallised. Glucose has a sweet taste, but less sweet than cane sugar.

Compounds of glucose with organic substances, the glucosides are found in plant tissues.

Fructose is found in fruit juices and honey. It can be made by hydrolysing inulin, a starch-like substance, by means of dilute acids. We find inulin, for instance in the tubers of dahlia or in the Jerusalem artichokes.

Cane sugar occurs chiefly in the sugar cane, an enormous grass with a massive stem in which tissue the sugary juice is stored. It grows only in tropical or semi-tropical climates. The cane is either sliced or crushed and the juice pressed out. The crushed cane is sprayed with water and again squeezed several times. The raw juice thus obtained, contains between 12% and 18% of sucrose and many impurities. Lime is added and the juice heated, then the impurities are filtered off and the juice evaporated in vacuum pans. The concentrated juice is allowed to crystallize. In this way the raw sugar is obtained from the sugar cane which has to undergo a further refining procedure. At first the sugar crystals which still have some molasses adhering to them, are rotated in centrifugal machines, then sprinkled "with water, that most of the molasses are carried off with the water, without dissolving the crystals. Stilt the sugar is not yet white and has to be further cleaned in filtering through charcoal. The colourless syrup obtained by this treatment has again to be evaporated in vacuum pans and is allowed to crystallise and dry by hot air. This is the product we know under the name of granulated or castor sugar.

Beet sugar is extracted from the sugar beet cultivated in all parts of Europe. The average sugar content of sugar beet is between 12% and 15%. To extract the sugar the beets are at first sliced and soaked in hot water. The sugar diffuses into the hot water together with dissolved mineral salts, some colloidal matter and other impurities. The next step is to concentrate the juice by boiling in vacuo. Finally the concentrated liquid cools down and crystallises. It is a thick mixture

of sugar crystals and mother liquor. The sugar crystals are separated from the mother liquor by centrifugal machines and represent then the "raw sugar", which has to be refined to become white sugar, as described above for cane sugar.

Honey comes from the plant kingdom. The bees suck the nectar out of the plants and in absorbing it into their organism change the nectar into honey. There are mainly two sources to be considered, the nectaries of the flowers which give us the so-called blossom honey which varies again according to the flowers and countries. The other source is the honey dew exuded in form of a sweet, sticky substance from leaves, needles and branches of herbs, bushes and trees. Usually this type of honey is also called forest honey. The main sources for honey dew are Picea excelsa, Abies alba, larch (**laryx decidua**) maple (**acer**) oak (**quercus robur**) and lime (**tilia**).

The chemical analysis shows that honey contains about 18% of water, many soluble organic compounds of various sugars, (invert sugar, cane sugar, melezitose), traces of organic acids and nitrogenous compounds (lime, iron, manganese etc.). Further we find various ferments, partly derived from the plants themselves, but mostly coming from the glands of the bees, diastase and invertase. All these details can be found in the comprehensive book written by Prof. Dr. Enoch Zander, Director of the Bavarian Institute for bee-cultivation in Erlangen. It is a recent publication dedicated especially to the study of the various pollens and methods to determine scientifically the origin of various kinds of honeys. After dealing with the content of ferments. Professor Zander continues: "they make the honey to a living entity and can be traced by biological research methods." Furthermore, we find in honey various formed objects, the pollen, cells of yeast and bacteria. Have the bees collected honey dew, then various algae, fungi and similar microscopic organisms can be found, which were living on the needles, leaves or stems of the plants from which the bees collected honey. Also certain impurities, soot, fibres from cloth, hairs from the bees can be found with a microscope.

Prof. Zander mentioned, that years ago there were still people who believed they could judge the quality of honey with their tongues or noses. It may be acknowledged that the test carried out with our senses may give some results, especially if the honey has characteristic qualities, but in most cases this method is insufficient and has to be abandoned. The chemical research also comes to its limits due to the fact, that the chemical constituents of honey are practically the same all over the earth. Whether a honey has been collected in Germany or Chile cannot be found with the most exact analytical methods, dealing with the water, sugar, ash and other contents of the honey. Chemical research is completely useless for determining the origin of various kinds of honeys. It can only reveal falsifications with cane sugar, etc.

Then there came the time, continues Prof. Zander, when it was thought possible to judge honey according to its biological differences. The content of ferments and diastase of foreign and inland produces would differ considerably. But soon it was found that also this was not a reliable basis for judgment. At the end only the microscopical test seems left. With it we can find if the honey is derived from flowers, then the sediment contains chiefly pollen, or if it is derived from honey dew, then it contains mainly algae, fungi and other microscopic objects from the plant kingdom. The Pollen is a kind of geographical document showing from which district or country the honey comes, if it is clover, or heather, lime, or forest honey. The pollen even tells us if the honey comes from Europe or other foreign countries. To judge this an intimate knowledge of the

pollen of various plants is necessary and therefore the book of Prof. Zander is dedicated entirely to the study of pollen.

Having considered these various sugars (glucose, fructose, cane sugar, beet sugar) and honey, we may perhaps also mention a well known substitute for sugar, saccharin. It has no nutritive value whatsoever, is exceedingly sweet (about 300 times as sweet as cane sugar) and is the imid of ortho-sulpho-benzoic acid. It is a purely chemical product, a white, cristalline powder, not easily soluble in cold water. Some countries prohibit its use as sugar substitute unless for medical reasons. Here, in England, it is freely used, especially now during the war for sweetening tea or coffee. Therefore we have included some experiments with saccharin in our present report.

We studied in the first place the plants themselves out of which sugar is extracted and compared the result gained by capillary dynamolysis with an experiment carried out at the same time under identical conditions with the manufactured product. Of course we can only give a small selection of experiments, but hope that it will be sufficient to make the reader understand the various most characteristic formative forces hidden in these substances. Nearly all the tests, published on the following pages with only a few exceptions, have been carried out with the help of gold chloride.

We start with an extract of sugar cane (Fig. 271) and compare it with unrefined cane sugar (brown crystals). (Fig. 272). As far as the formative forces are concerned, the fresh sugar cane is more lively, the colours are more vivid, the rising height considerably higher, compared with the cane sugar. Quite objectively judged, the cane sugar has lost some of the original formative forces in the manufacturing process.

The fresh extract of a sugar beet (Fig. 273) shows a very delicate but rich formative force, with light purple, green and yellow tinctures. The experiment with beet sugar (Fig. 274) looks much more rigid, hard, and has definitely lost a good deal of the original plant forces. The rising height is increased in the experiment with sugar beet. Since the tests are carried out at the same time under identical conditions, the differences in rising height are entirely due to the differences of the substances.

Maple Sugar (Fig. 275) shows a beautiful delicate structure especially in the lower part of the picture. It is more lively than the refined white beet sugar, even more lively than the unrefined cane sugar.

Golden Syrup (Fig. 276) is also very beautifully formed and coloured. The forms are characteristic and differ from all the previous ones. Fig. 277 is an experiment with another variety of golden syrup and shows the same characteristic forms.

Dried Figs (Fig. 278) have a very strong formative force hidden in them. The original was beautiful in coloration, light and darker purple shades intermingled with blue and greenish yellow. Much of the life process of the plant is still active in this extract.

Dates (Fig. 279) produce more delicate forms than figs, but also here we see a rich formative force moulding and shaping characteristically. The colours were light purple, light green and yellow.

The following experiments deal with various kinds of honey. We start with English Honey: – Gloucestershire (Fig. 280), Berkshire (Fig. 281), Yorkshire (Fig. 282), Otterburn Heather Honey (Fig. 283). These four examples show already how entirely different honey is from the previously studied substances. Its formative power is very strong and different for each variety. Let us turn

back to the statement of Prof. Zander, that chemical research is useless for determining the origin of various kinds of honey because the chemical constituents of honey are practically the same all over the earth; biological methods too are insufficient, and still more the subjective judgment of our senses. May it not be possible that our method of capillary dynamolysis, dealing with the formative forces hidden in all the substances, could be of great value in this direction?

Fig. 284 is an example of Swiss Honey and Fig. 285 of Tyrolean Honey.

Fig. 286 comes from Greece and Fig. 287 is again an English produce blended with invert sugar. Here we see definitely a disturbance in the usually clear, bright forms of pure honey. The forms are unsharp, washed out, the colours dulled down.

Figs. 288 and 289 are two examples of South African honey, rich in radiating lively forms and beautiful in colour.

Figs. 290 and 291 are two examples of Californian honey and Fig. 292 an example of New Zealand honey followed by Gold Chloride, (Fig. 293) the same honey followed by Silver nitrate. Gold chloride and silver nitrate are able to reveal the formative forces of honey; but the experiments with silver darken so quickly, that it is very difficult to get a good photograph in time. Fig. 294 and Fig. 295 give another example of New Zealand honey followed by gold chloride and silver nitrate respectively.

These few examples have to suffice, but we hope that they give a good impression about the variety of formative forces hidden in honey. We have dedicated many years to this interesting study and never get tired of trying any specimens we may be given again and again. Honey is a very valuable substance, which is scarcely enough appreciated, as far as its nutritive and remedial qualities are concerned,

Let us turn from honey to Saccharin for a moment, which is three hundred times as sweet as cane sugar, but has no nutritive value whatsoever. It tastes like sugar, but just is not sugar. What formative forces can we find in Saccharin? Figs. 296 and 297 answer this question. No formative force can be found with the capillar dynamolytical test, neither with gold chloride nor with silver nitrate. The slight indentations on the borderline cannot be compared with any of the sugar or honey experiments. It is a completely dead product.

Rudolf Steiner's advice regarding the feeding of bees with sugar.

Sometimes it happens that the bee keepers have to feed their bees in winter with sugar. It is unnatural for bees to feed on sugar instead of on nectar and honey. Their metabolic system is burdened with the task of transforming sugar into honey and weaker bees may not be able to do this. Rudolf Steiner advises adding to the sugar camomile tea, thyme and some salt. He explains that, taking the flowers of the camomile plant, that part of the plant is used which prepares the nectar. Every plant contains potential honey and the camomiles contain this process in an even greater degree than other plants. On several occasions we have pointed out in this publication, that it is essential to study the processes, not only the substances; that, for instance, the silica process embraces much more than the silica substance; thus we have to study the process which leads ultimately to the substance honey. In the camomile plant there is hidden a process which directs the sugar sap of this plant towards the formation of honey. Therefore if we add to the sugar camomile tea we introduce the process of honey formation. Rudolf Steiner goes so far as

to say: we make the sugar like honey. Some salt is added, because salt helps to digest otherwise indigestible things.

We wondered if it would be possible to find an experimental proof for this statement of Rudolf Steiner. Having studied carefully the various sugars and kinds of honey and also the camomile plant (Part III, Chapter V, Fig. 206) we made a test with camomile tea and thyme followed by gold chloride, see Fig. 298.

The experiment shows considerable changes compared with the extract of camomile alone, mentioned before. It demonstrates the effect of Thyme added to the camomile extract. The next experiment consisted in adding sugar to the camomile-thyme mixture.

The result is surprising. We have to study objectively the difference between Fig. 206 in Part III, Chapter V (Camomile alone). Fig. 298 (Camomile and Thyme), Fig. 299 (Camomile, Thyme and Cane Sugar), Fig. 272 (Cane Sugar). We can recognise the influence of sugar; we can find some characteristics reminding us of the camomile experiments, but there is something more expressed in the forms of the last experiment. We turn our eyes to the various honey tests and find some similarity with Fig. 286 (Greek Honey). It is not identical with Greek Honey, but a process has been initiated which tends towards honey. This tendency becomes clear when comparing the experiment carried out with Greek Honey and the other one with Camomile, Thyme and Sugar. If the necessity arises to feed bees it will certainly help them if Camomile, Thyme and some salt is added to the sugar. The correct formula for this purpose is:

65% sugar
25% water
10% camomile tea with thyme
1 gram salt.

The camomile tea is prepared in the following way: Bring water to the boil, add 5 grams of dry camomile flowers to 100 cc. water and 0.5 grams of dry thyme cover the pot with a lid, let the tea simmer for 5 minutes, then, keeping covered, allow to cool. From this tea 10% is added to the above-mentioned recipe.

Fig. 271 Sugar cane followed by 1% gold chloride

Fig. 272 Cane sugar (yellow) followed by 1% gold chloride

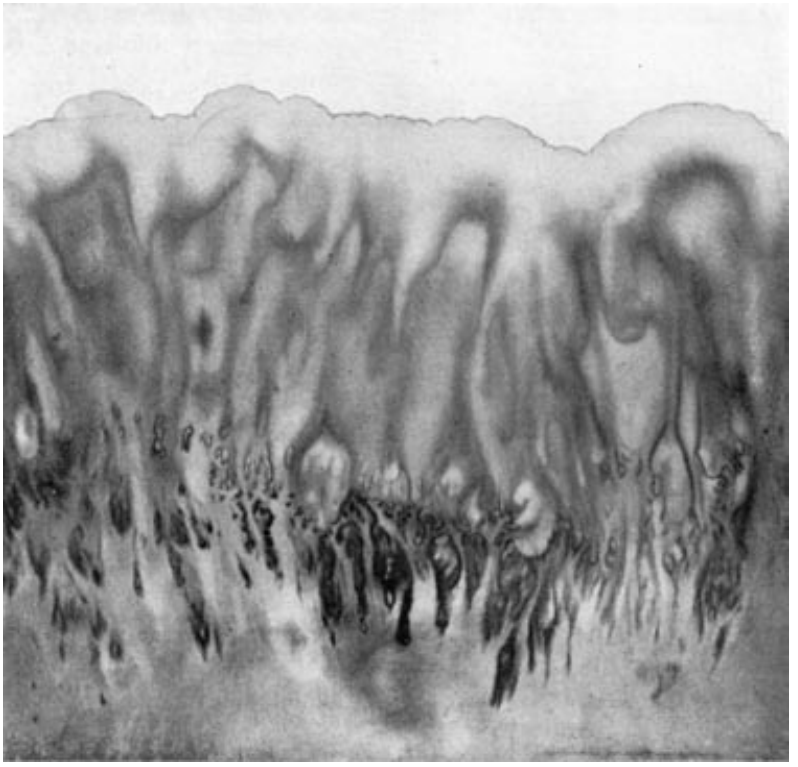


Fig. 273
Sugar Beet followed by 1% gold chloride

Fig. 274 Beet Sugar followed by 1% gold chloride

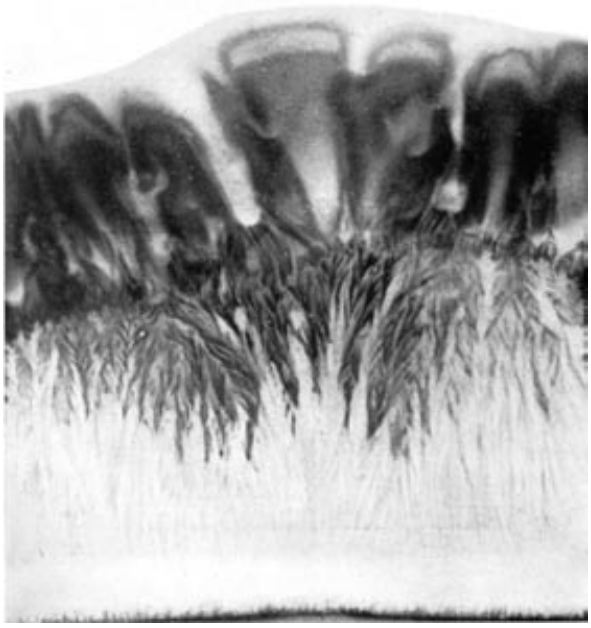


Fig. 275 Maple sugar followed by 1% gold chloride

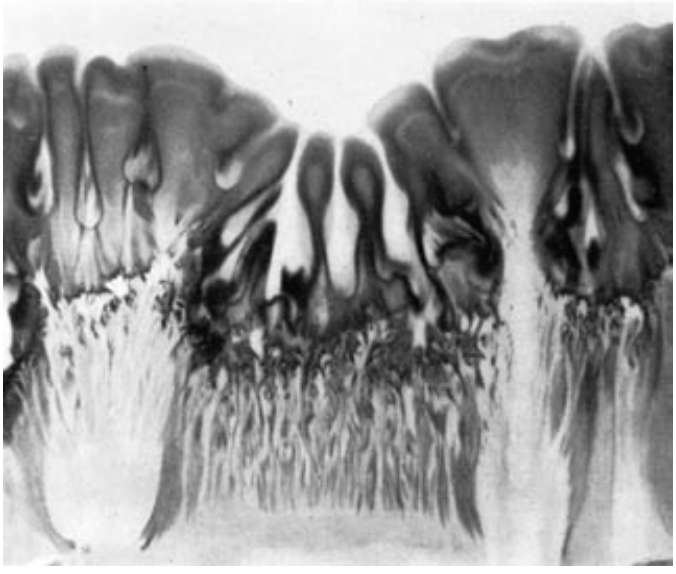


Fig. 276 Golden syrup followed by 1% gold chloride

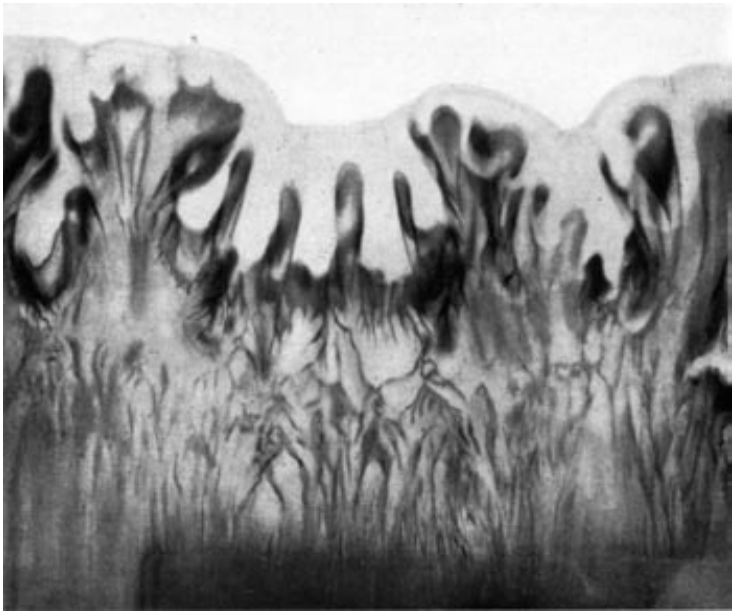


Fig 277. Golden syrup followed by 1% gold chloride

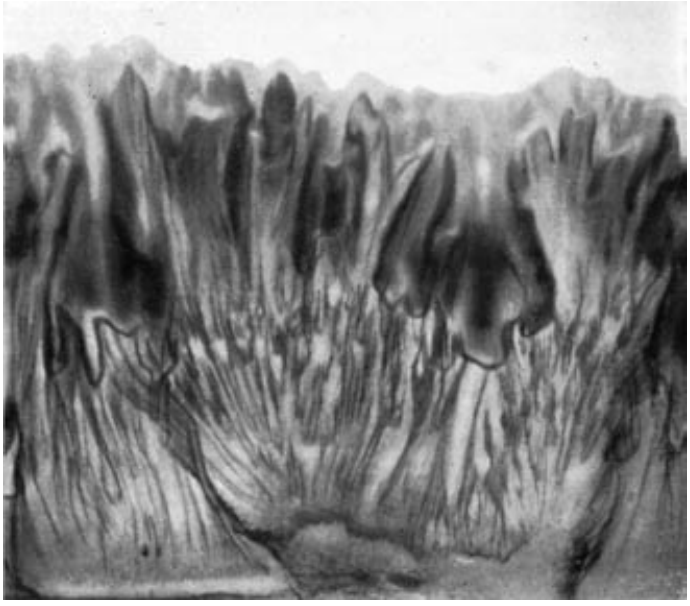


Fig 278. Dried fig followed by 1% gold chloride

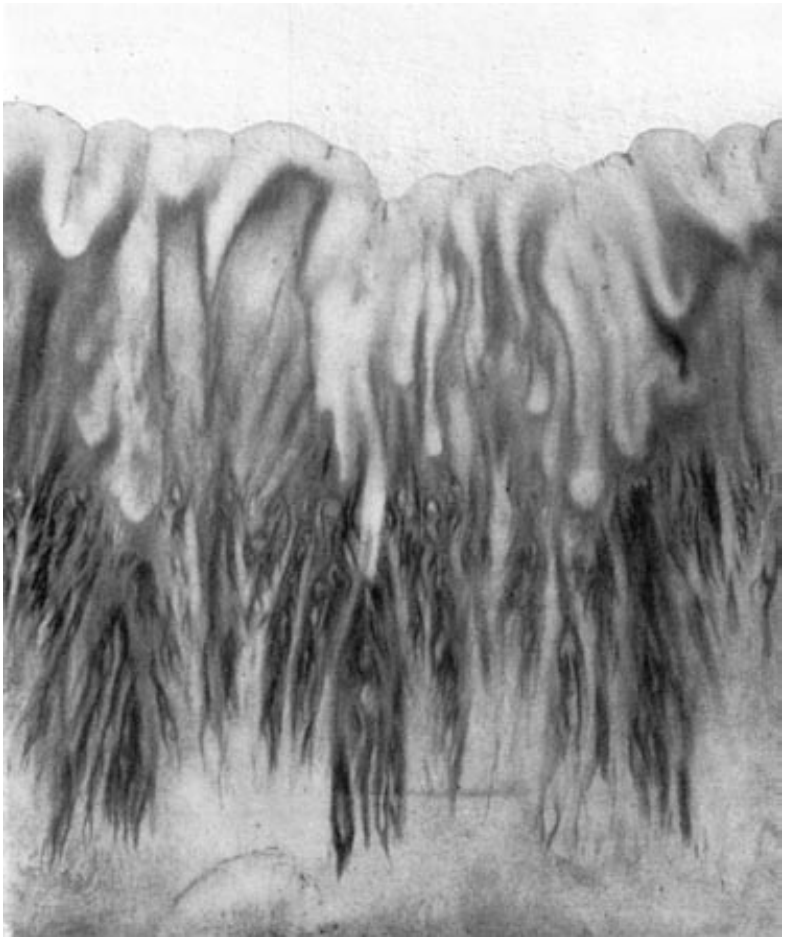


Fig. 279 Dates followed by 1% gold chloride

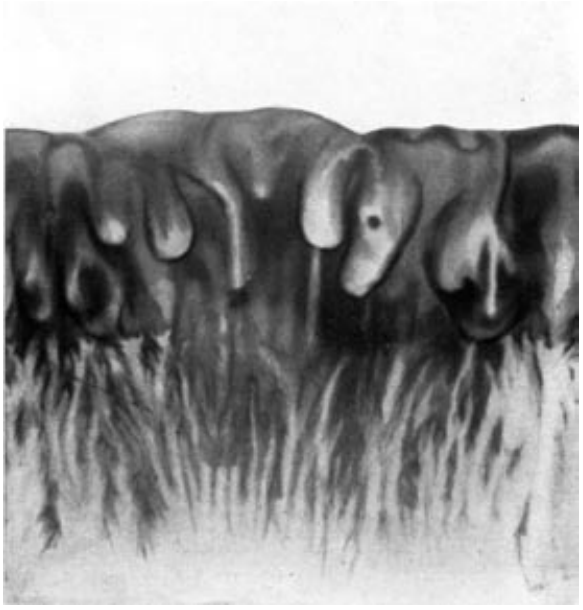
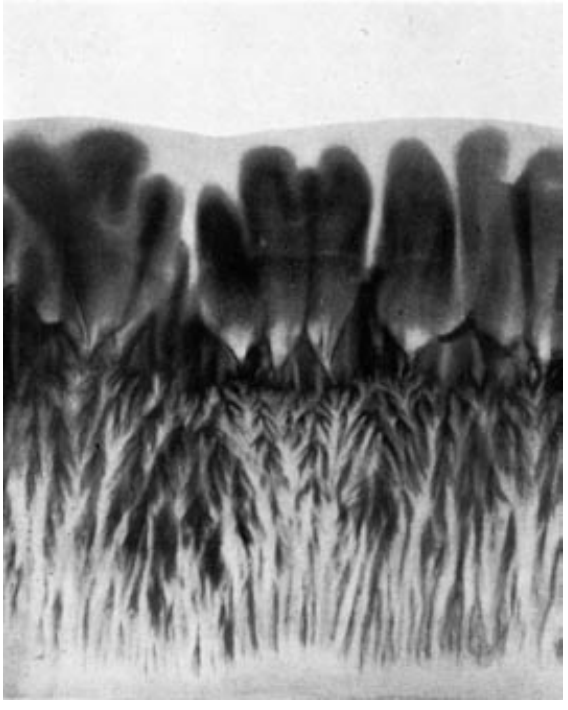


Fig. 280 English honey followed by 1% gold chloride

(Gloucestershire)

Fig. 281 English honey followed by 1% gold chloride

(Berkshire)



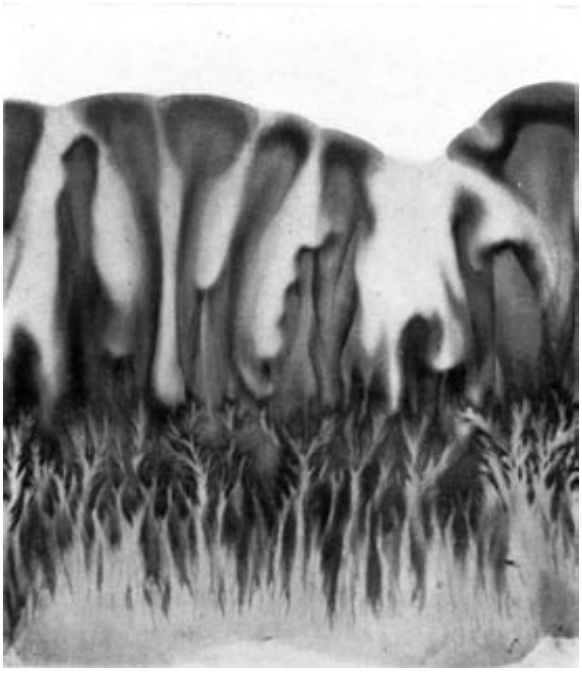


Fig. 282 English honey followed by 1% gold chloride

(Yorkshire)

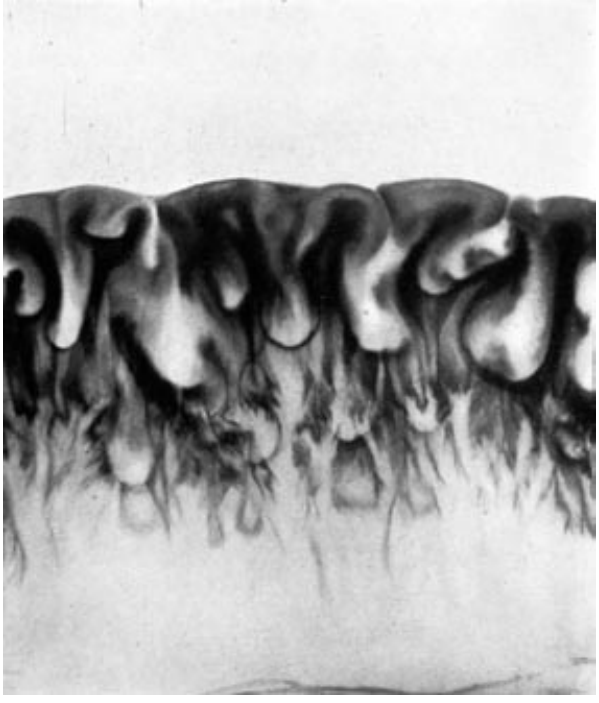


Fig. 283 English honey followed by 1% gold chloride

(Otterburn Heather)

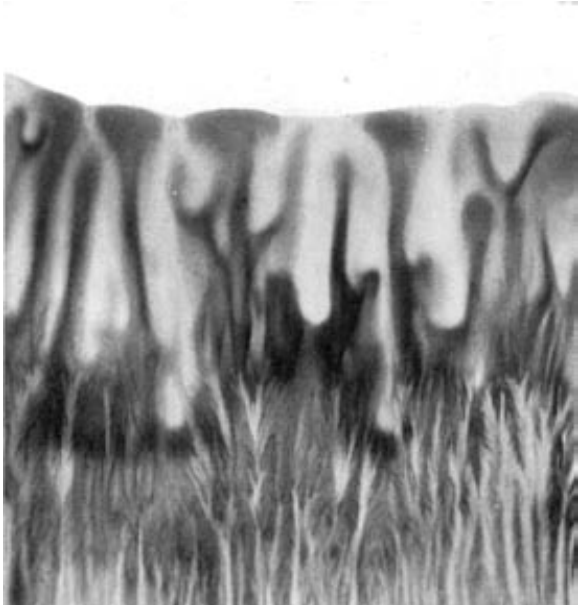


Fig 284. Swiss honey followed by 1% gold chloride

Fig 285. Tyrolean honey followed by 1% gold chloride

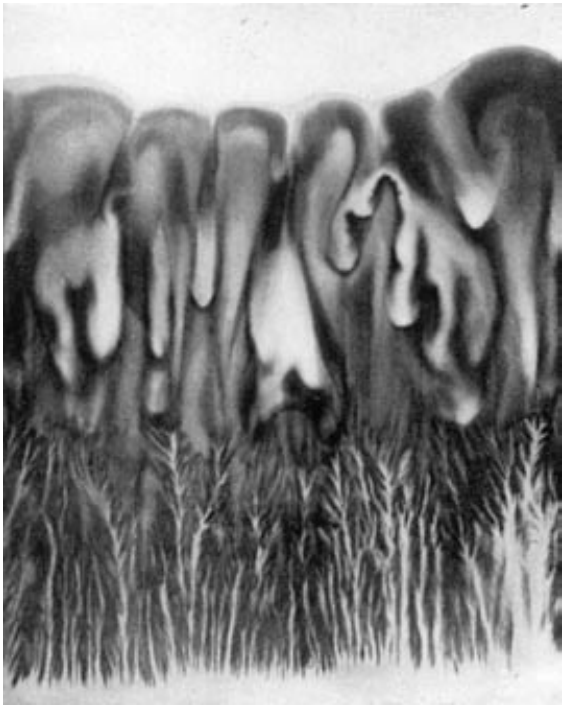


Fig. 286 Greek honey followed by 1% gold chloride

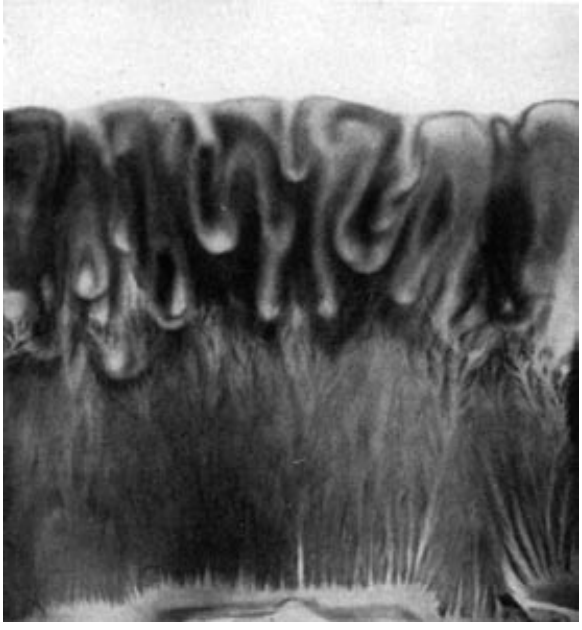


Fig. 287 Honey blended with invert sugar followed by 1% gold chloride

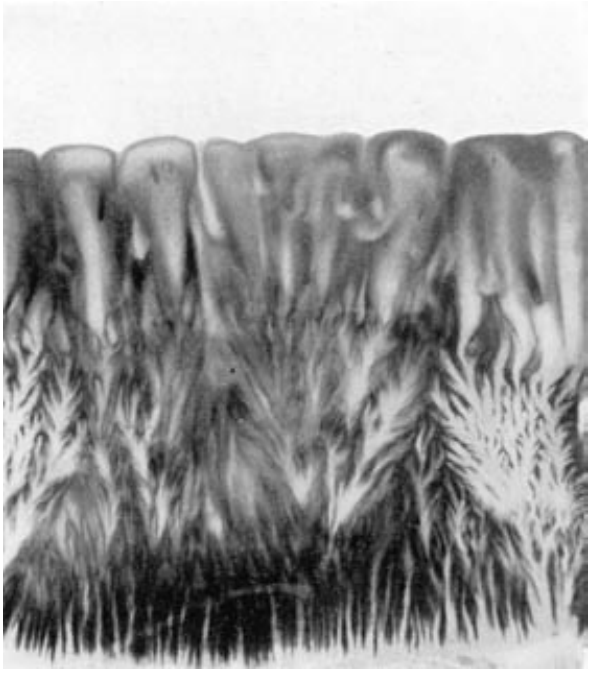


Fig. 288 South African honey followed by 1% gold chloride

Fig. 289 Tyrolean honey followed by 1% gold chloride

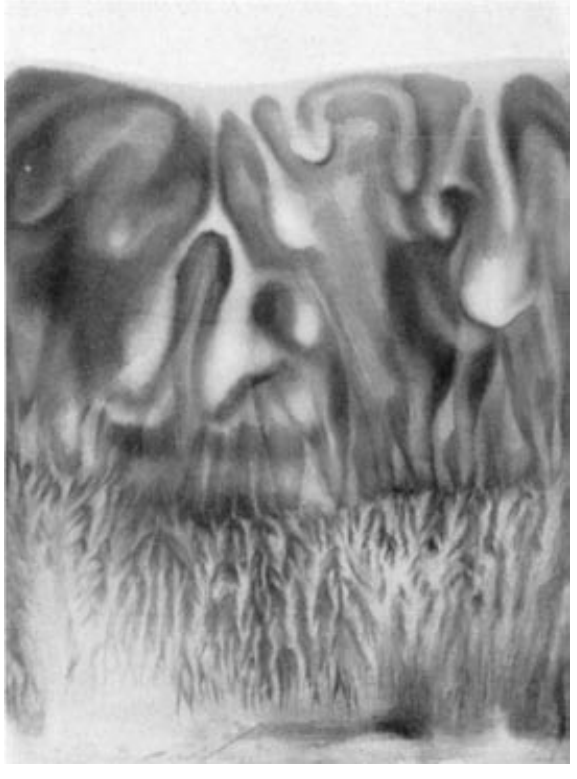


Fig. 290 Californian honey followed by 1% gold chloride

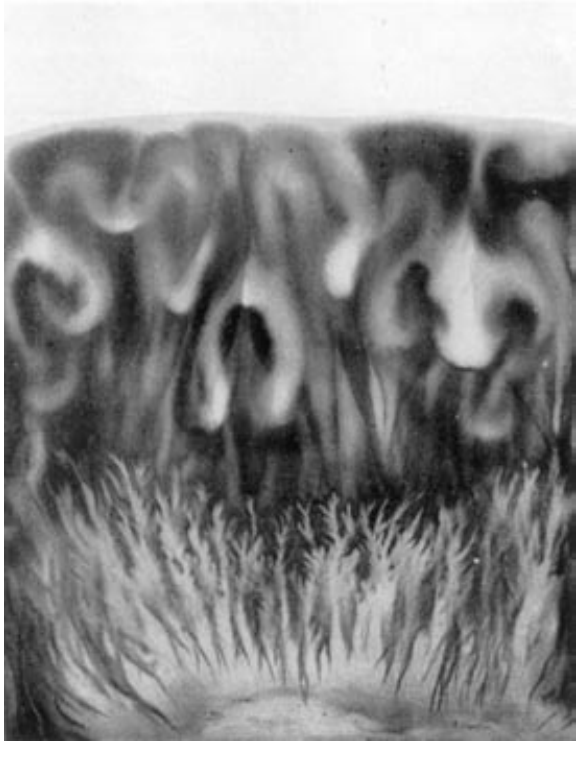


Fig. 291 Californian honey followed by 1% gold chloride

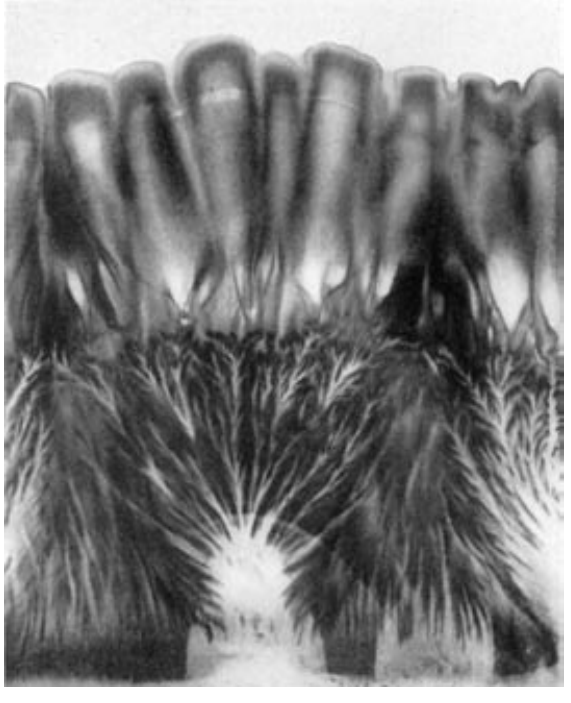


Fig. 292 New Zealand honey followed by 1% gold chloride

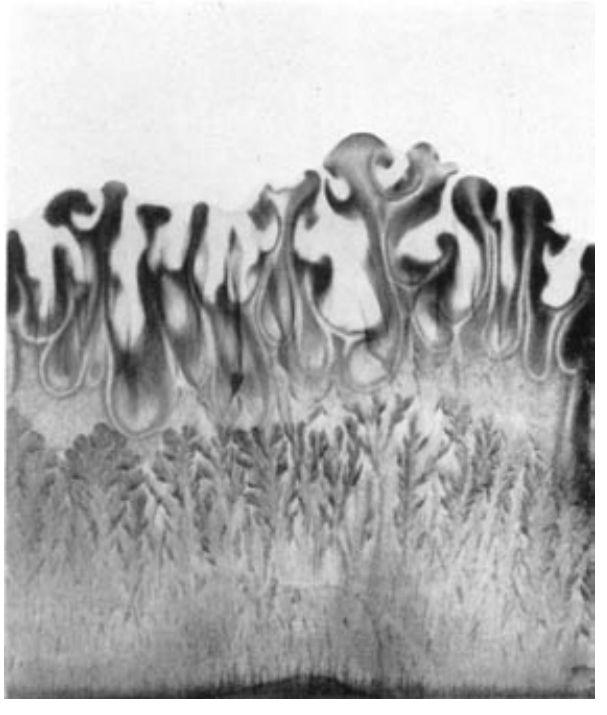


Fig. 293 New Zealand honey followed by 1% gold chloride

Fig. 294 New Zealand honey followed by 1% gold chloride

Fig. 295 New Zealand honey followed by 1% silver nitrate

Fig. 296 Saccharin followed by 1% gold chloride

Fig. 297 Saccharin followed by 1% silver nitrate

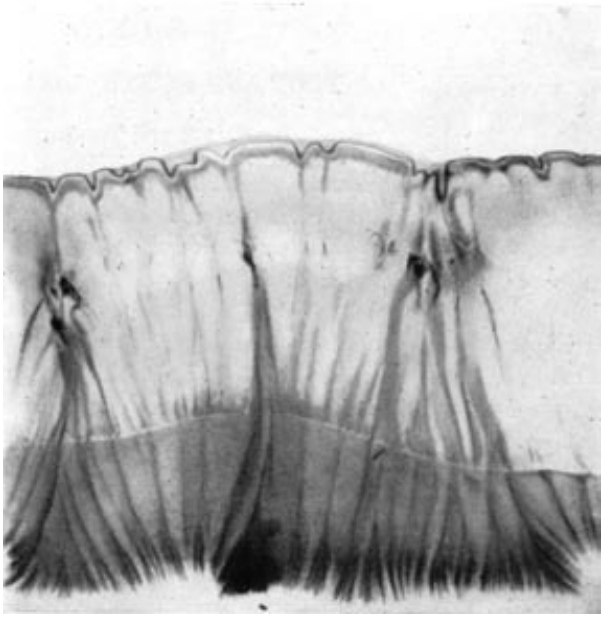


Fig. 298 Camomile and thyme followed by 1% gold chloride

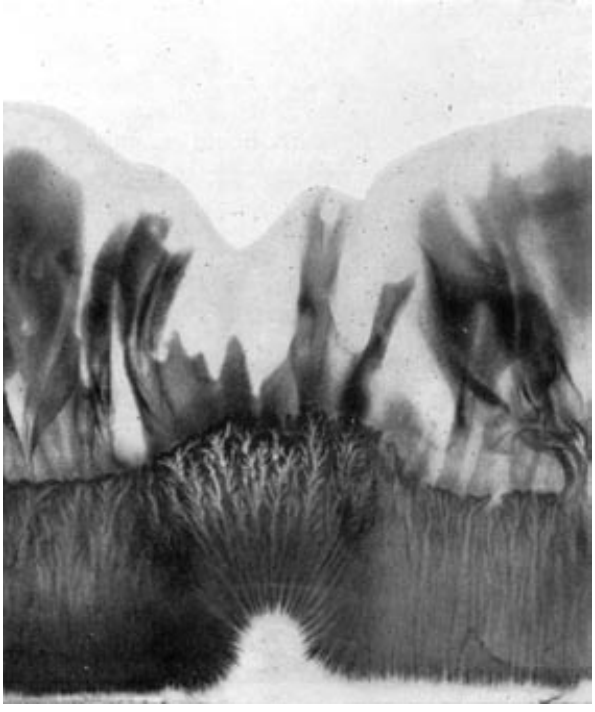


Fig. 299 Camomile, thyme and cane sugar followed by 1% gold chloride

Chapter XVII.
FOOT-AND-MOUTH DISEASE*
Its Nature and Treatment

In the last few decades epidemics of foot-and-mouth disease have become increasingly widespread and devastating in their effects, both in Europe and in America. Remarkable research work has been done in the effort to elucidate its nature and treatment. But, in spite of this, it cannot be said that we have gained a full insight into the nature of this mysterious malady, or obtained any really satisfactory method of cure. One might even say, that to-day no attempts at all are made to cure the diseased cattle; it seems easier to kill them as soon as possible, burn the bodies and compensate the farmers. Millions of pounds are wasted.

In the following pages we propose to report on experiments that have been made with a new remedial and prophylactic treatment for foot-and-mouth disease. Though these experiments are still in their initial stages, one can already be convinced that they will lead eventually to a successful method of combating the ravages of this disease. The application of the remedy, described here, is not the result of arbitrary or merely empirical experiments. It is the rational outcome of a lively conception of the nature of the disease itself. In this, as in all scientific work, clear theoretical insight provides the strongest and most fruitful impulse to overcome the difficulties which may arise, to begin with, in the practical realization of a remedy or discovery.

The suggestion of treating foot-and-mouth disease on the lines described here was due to the indications made by Dr. Rudolf Steiner. His indications as to the cause of the disease, and as to the specific remedy which would counteract it, led us to prepare the remedy, to undertake the tests and investigate its effectiveness in practice. In the course of this work we gained many important points of insight into the nature of the disease itself.

The tests were undertaken by the Biological Institute at the Goetheanum in Stuttgart, which was transferred some years ago to England.

The possibility of carrying out numerous experiments during, the epidemic of 1920-22 in Württemberg (Germany) was due to the co-operation of the veterinary surgeon, Dr. J. Werr, to whom we express here our sincerest thanks.

The effect of the remedy will best be understood if the particular conception of the nature of foot-and-mouth disease, which we believe to be essentially the true one, is first explained in detail from the actual symptoms of the disease. The connection between the remedy and the essential nature of the disease will then become apparent.

The Nature of Foot-and-Mouth Disease

The great variety of symptoms and phenomena of the disease may briefly be described as follows:

After the initial fever, inflammatory blisters or vesicles appear in different parts of the body, especially about the mouth and feet. They are either quickly healed, in which case the disease comes to an end, or else serious -changes take place in the inner organs, in the intestines, for example, and above all in the heart. These changes are often fatal. It is of great significance, that the disease of the inner organs, especially the heart, is generally the less evident the more the vesicles and resulting sores appear. The most severe cases are those which show the foot-and-mouth

* A pamphlet written and published by Dr. E. Kolisko many years ago. Revised and enlarged by L. Kolisko.

symptoms least, but in which the heart symptoms, on the other hand, become apparent at an early stage. We have to do with a disease process which is either overcome by the animal through the formation of vesiculae following on an initial fever, or else results in a destructive disturbance of the heart.

To prevent the morbid condition of the heart from setting in, or to counteract it as soon as it has begun, is the task of a remedy for foot-and-mouth disease.

We need only study the course of the fever to recognize that there are in a certain sense two phases of the disease. There is the initial fever which appears on the first day of the illness and introduces the forming of the vesicles. A second stage of fever appears about the fifth, seventh and ninth day of the illness. Its maximum is almost invariably a little below the maximum of the initial fever. This second fever must be regarded as the critical and decisive stage. In a lesser degree it is nearly always to be detected, even in the lighter cases. After it, the general condition will either return to the normal, or else a very sudden fall of temperature will be followed by a rapid decline, and progressive deterioration of the cardiac condition leads to a fatal issue.

Thus the first fever indicates the approaching formation of the vesicles, while the second fever points to the characteristic morbid symptoms of the heart. (The connection of the second fever with the morbid processes in the heart was notably established by Dr. Werr, who had a large number of cases under supervision during the epidemic in Württemberg in 1920-22.)

If the vesicular symptoms predominate and the disease comes to an end at this stage, we are dealing with the so-called lighter form of the epidemic. The malignant form, on the other hand, is characterized by the early appearance of heart symptoms. Nevertheless, the disease process is essentially the same in the two cases; it only expresses itself more in the one direction or the other.

The first phase of the Disease – Foot-and-Mouth Symptoms

The first phase of the disease is characterized by the forming of vesicles, which may extend to many parts of the body. The blisters appear.especially on the mucous membrane of the mouth, particularly the tongue, the hard palate, and the upper lip. They are more like boils than blisters. Often', they develop so rapidly as to coalesce and as a result the epithelium is shed over large areas of the mucous membrane. This is accomplished by salivation and excessive nasal secretion, which may be exceedingly profuse, so that quantities of ropy secretion hang from the animal's mouth and nose.

One has the impression that the most sensitive part of the mucous membrane of the digestive tract, namely the mucous membrane of the mouth, which is richest in sensory and nervous elements, is being expelled as a foreign body from the organism, with a most violent reaction.

The other situation of these intense morbid changes is in the region of the **hoofs**. Here the vesicle formation can be perceived at an early stage, on the third or fourth day of the illness, in the cleft of the hoof and on the ball of the hoof. In the more severe cases they appear right inside the hoof. The vesicles take their start from the epidermis in the cleft and become prolonged under the hoof, forming long narrow cavities with severe suppuration. Eventually this may lead to a complete severance of the hoof.

Why is it that the reaction takes place just at this point? Because here in the hard, horny layers of the hoof, the metabolic forces are to a certain extent impeded. Even in the normal condition,

the hoof acts to some degree, like a foreign body, damming up the free flow of the body fluids. It is here that the eruptions can show themselves most strongly. The natural process of healing, which tends completely to eliminate the hoof that has become like a foreign body to the organism, can be assisted and forestalled by a proper surgical treatment of the hoof, room being made by excisions for matter to flow out.

The blister formations in mouth and feet are undoubtedly the most important, and such blisters as are formed in the other parts of the body, for instance on the udder and on the tender skin of the breast and belly, are of secondary significance. A general eruption never occurs. The reaction remains more or less inside the animal and only finds its way to the surface in those parts of the body which are in any case most highly developed in the ox. That is to say, it goes towards the mouth and the digestive tract, and to the skin of the belly, legs and feet.

From the very outset of the disease a certain apathy, anorexia, and in many cases an expressionless kind of stare, can be observed in the animal. The sense organs are no longer directing their activity, as in the normal condition, to the impressions of the outer world. The activity of the brain, too, is lowered. The sensorium is slightly dimmed. The senses and the brain are to some extent isolated from the rest of the body and turned inwards. Instead of the normal reaction to the impressions of the outer world or, again, instead of the normal secretion of digestive juices in the digestive tract (for there is nearly always marked constipation) widespread secretions occur in the mucous membranes, and other secretions too, which often become purulent.

To sum up, we have the impression that the sense organs and especially the nervous system are becoming isolated from the rest of the body. To avoid misunderstandings, we must here draw attention very definitely to an aspect that has hitherto been insufficiently considered. A satisfactory solution of many physiological problems will not be found if we do not enter into the fundamental fact, that both in the human and in the animal organism two kinds of processes are to be found, which are fundamentally different, nay, opposite, to one another. The one is the activity in the **nervous system**, which is especially concentrated in the brain and sense organs, i.e., in the head. The other is the **metabolic activity**, which takes its start from the digestive process, and has, moreover, a main focus of activity in the tissues of the limbs.

The system of nerves and senses comprises, in the first place the brain and the sense organs, also the spinal cord and its nerves. While it is concentrated mainly in the head, this system radiates out to the whole body. There is no part of the animal or human organism void of sensory and nervous activity. Nevertheless in the head this form of activity predominates.

Again, the metabolic-muscular system comprises, in the first place, the large abdominal digestive organs and the legs, where, as we know, in the muscular movements, a most important part of the metabolic process takes place. While in the digestive organs the substances are received and elaborated, the main consumption of metabolic products takes place in the muscles, especially the limb muscles. The movements of the limbs may increase the metabolism by as much as 50%, but there is no part of the organism that is not also permeated by metabolic activity.

Countless other points of contrast may be found between the two systems. For instance, in the head there is relatively most of the bony substance. Here the hardening process has gone farthest. The nervous substance itself, which is relatively predominant in the head, is the least capable of regeneration; it has the least vitality, its metabolism is slow and dull. The opposite is the case in the lower (or hinder) portions of the human (or animal) body. Here there is comparatively little

hardening, but much vitality and mobility of metabolic processes. Upward in the human body there is much consciousness and little life, downward there is much life and little consciousness.

Without taking these elementary contrasts into consideration, we cannot do justice to the real processes in the living body. The wealth of facts, so wonderfully collected and described in modem science, in anatomy, physiology, and pathology, remains more or less chaotic and unorganized without these guiding principles.

Between the head processes and the metabolic processes stand those of *respiration* and *circulation*. They are of a **rhythmical** nature. Respiration, concentrated in the lungs, is nearer the activity of the nerves and senses, than is the blood circulation, which springs from the metabolic process and is concentrated in the heart. The former, too, is more conscious than the latter. Both have their centres in the chest, i.e., in the middle part of the human or animal body. Nevertheless these rhythmical processes too are spread over the whole body, for the breathing activity works everywhere, and there can be no part of the body without blood circulation. The division here indicated, which was first described by Rudolf Steiner in his book *Riddles of the Soul*, is not a sharp division in space, but a **dynamic**, functional division. It only finds spacial expression, to a certain degree, in the upper, lower, and middle portion of the body. Where there is most nervous activity functionally, there, too – in the brain and senses – the nervous system is most apparent, and gives to the head its characteristic shape and character, and so on.

Regarded from this point of view, foot-and-mouth disease appears as an interruption of the proper connection between the nerves-and-senses system and the rest of the body. To begin with, the apathy, the expressionless stare, the slight disturbances of consciousness, point in this direction. Then we have the disease of the feet. The horny formation of the hoofs belongs to the skin. They are thickenings of the surface layer of the skin, and this, genetically, is derived from the nerves-and-senses layer of the embryo – from the ectoderm. In the suppurative process the hoof becomes a foreign body. It becomes isolated and at length eliminated, So it is when other portions of the skin, on the udder and the belly, for example are attacked. On the other hand, it is only in rare cases that vesicles are formed about the horns, and in very rare instances an inflammation in this region has been followed by the loss of the entire horn. But as a general rule, we have the impression that the resistance is too great in the region of the horn, and the flow of the fluid, returning thence, seeks other outlets.

Finally, we come to the mucous membrane of the mouth. Though not belonging directly to the system of nerves and senses, the mouth, of the whole region of the digestive tract, is most permeated by sensory and nervous elements. It is the most sensitive; thus it is the seat, for example, of the sense of taste. It too becomes like a foreign body in foot-and-mouth disease, and the more it becomes isolated, the greater is the secretion of saliva and of other fluid in the vesicles. In place of the normal sensory function and digestion we have salivation, blistering, a process which eventually goes farther inward towards the intestines, producing haemorrhage and diarrhoea.

The conditions are very similar to this in the second stage of **canine distemper**, where there also occurs a reaction (though in this case it is far more general) of the metabolism in the mucous membrane against the isolation of the nervous system. The vesicular eruptions in the mouth may pass over to the mucous membrane of the paunch and other stomachs, and in the end the whole of the intestines, including the rectum, may become involved. Here the vesicles and ulcers only differ from those in the mouth by the greater effusion of blood into the vesicles and the more

rapid loss of the epithelium. Thus at various places in the intestinal canal, we find intensely red foci of inflammation suffused with blood, also erosions and swellings of the mucous membrane. These are generally more intense and numerous in the stomachs than in the intestines. The disease may lead to a complete disintegration of the mucous membrane, giving the picture of a severe gastro-enteritis, which may end fatally. In such cases the faeces are generally hard and dry, or they may be covered with blood and mucous. Severe constipation occurs, one of the most important symptoms of the disease, but there may also be diarrhoea, especially in the later stages.

This internal or gastro-intestinal variety of the epidemic represents a form of disease in which the symptoms are already transplanted far more deeply into the inner parts of the organism. It is as though the process were no longer able to express itself outwardly to a sufficient extent; the inner organs also become diseased. Haemorrhage takes the place of a secretion of mucous and the mucous membrane becomes isolated even in those parts where it is normally given up to the forces of the metabolic and digestive system. It is a long way from the hoof (which is more or less isolated from the very start, and in which the hardening forces of the nerves-and-senses system are even normally predominant) to the mucous membrane of the stomach. It may not be out of place at this point to recollect how much more frequently **sheep** and **goats** and even **pigs** become diseased in the hoofs only. In these animals the process remains more in the periphery; in them the feet are relatively more important. In the ox the process tends to go inward; hence the great danger of foot-and-mouth disease in cattle.

In earlier epidemics the eruptions on the udder and elsewhere seem to have been more frequent, but in the devastating epidemics of recent years the inward morbid symptoms were increasingly predominant. Even among sheep and goats severe epidemics accompanied by fatal cases have occurred. The more the isolation of the nervous system extends to the spheres which essentially belong to the metabolic and rhythmic systems, the less can the reaction express itself in colourless secretions of mucous, etc., and the more does it take on the dangerous forms, with deep-seated lesions. Thus, the internal, gastro-intestinal form of the epidemic is a transition of the profounder changes of the second phase, of foot-and-mouth disease – namely, the implication of the heart.

The second phase of the illness: the affection of the Heart

The second phase is characterized by the heart symptoms coming into the foreground. In these cases we speak of the malignant form of foot-and-mouth disease, which has been especially predominant in the severe epidemics of the last few decades. The intensity of the destructive process with which we are faced here, shows itself most of all in the morbid changes which we find in the heart on post-mortem examination. We find greyish-red and greyish-yellow spots throughout the whole musculature of the heart. The heart looks brittle, clay-coloured. It often looks, as though it had been boiled. Microscopic examination shows the muscular substance broken up into minute lumps and fragments. Haemorrhage and far-reaching degeneration of the entire heart muscle is the characteristic picture in severe cases. Sometimes the heart is altogether flabby and can easily be pressed inward with the thumb. The right ventricle is frequently distended. In other cases the changes are outwardly less noticeable, but inwardly we find the heart filled with the above described clay-coloured centres of degeneration. It has a mottled appearance.

We nearly always find considerable effusions of blood in the endocardium and pericardium. We may say that in this morbid process there is a tendency completely to destroy the heart.

How these appalling changes in the heart gradually come about is far more intelligible when we have observed the changes of the pulse from the very first days of illness, especially in a severe epidemic. Even in the stage of initial fever the pulse beats are more rapid, and the breathing too is accelerated. Indeed especially in severe cases, there is scarcely a moment in the whole course of the illness when the rhythmic system, expressing itself in breathing and blood circulation, is not disturbed. The preliminary stages of the heart affection are soon recognizable in the increased intensity of the beat, which is at first accelerated and then, in many cases, very much retarded. As a rule, more or less pronounced murmurs and cardiac arrhythmia are sooner or later to be observed: often there are dropped beats. These phenomena are frequently accompanied by a deep-seated disturbance in the distribution of the bodily warmth. The legs and ears feel cold, and as the heart symptoms grow worse, the bodily warmth gradually withdraws inwards from the periphery of the animal in a most alarming way. Starting from the extremities and working inward, the animal grows cold.

During the epidemic in Germany in 1920-22 we had occasion to examine many animals, particularly with regard to these heart symptoms. We found that they begin shortly after the initial fever has set in, while the rapid formation of vesicles is in full swing. Especially the intensified heartbeat, the least severe of these symptoms, shows itself very early in many cases. This is very significant; it means in effect that the initial stages of heart degeneration are present even in those slight cases in which the affection of the heart, properly speaking, never occurs and only the foot-and-mouth symptoms become visible. The disease process therefore is a unity. Even in the very slight cases, which stop short at the first phase and where this phase alone comes to expression, there are always suggestions of a progressive disease of the inner organs. Conversely, there is no form of the disease, however malignant, in which the characteristic vesicles in foot and mouth do not appear in some degree.

What, then, do the heart symptoms signify? To begin with, the interrupted connection between the nerves-and-senses system and the rest of the body showed itself in an intense reaction in the more peripheral organs. Now it shows itself directly in the centre of the blood circulation, which has above all the task of maintaining this connection. The heart is the organ in which all the contrasts of the upper or nerves-and-senses system are balanced and harmonized. Here, in its very centre, the rhythmic, balancing system is now destroyed. The more malignant the epidemic (the more its real nature becomes apparent) the earlier do we observe the fact in the morbid changes of the heart. The destruction of the heart is the full and final expression of the destruction of the circulation of the blood, which regulates and balances all the contrasts in the body.

"Fodder and drink are refused, defaecation is infrequent or absent altogether, the eyes are closed, the feet and tail are cold to the touch, the temperature is 98.6 to 99.4 degrees, the pulse quick, feeble, and intermittent; the heart beat loud and strong. Occasionally the animals holds its head towards the heart and remains in this position for five or even ten minutes. The body sways as the animal moves about and often it falls down and dies on the spot."*

In this description of the final stage, the real essence of the disease is fully and completely expressed. On the one hand, there is the lowering of consciousness, the senses and the brain activity are dim, while on the other hand digestion and limb movement are more or less paralysed. The

* Dr. Carlo Rossi. Practical Obitervations on the Malignant Form of Aphtous Fever, "Berliner Tierärztliche Wochenschrift," 1901, page 495.

head and hindquarters of the animal confront each other like lifeless masses, deserted as it were by the life-giving circulation, while between them – hopelessly palpitating – is the destroyed and swollen heart.

In the heart the influences of the two systems meet; hence the heart is in all respects so very largely autonomous. It contains as it were its own "brain" and its own "nourishment". It is the only organ with a nervous system, sharply distinguished both from the sympathetic and from the central nervous system, while through the coronary cycle it nourishes itself as it were by its own function. The sensory element, sense perception, consciousness, which are predominant upward in the head and brain – and the motor element, which expresses itself above all in the muscles of the limbs and the digestion, are united in the heart to a single unity. Hence in the heart we even find the nervous substance (the sensory element) far more like the muscular substance (the other element) than anywhere else in the body. In such considerations we come far nearer to the essential nature of the heart than when we compare it with a pump. It is at this most independent centre in the organism that the morbid processes of foot-and-mouth disease makes its attack in the later stages.

From the very outset it is the rhythmic system that becomes involved when the epidemic begins to assume a dangerous form. So long as the balance between the systems, separated by the disease process, is still maintained by the serous fluid which pours into the peripheral increasingly isolated regions of the nerves-and-senses system, the danger is averted, the circulation still performs its function, though abnormally, through the reaction of the metabolic system to the disease. But in course of time this grows more and more difficult. Effusions of blood take place into the inner organs, and at length the circulation itself becomes diseased in its central organ. But in these malignant cases the approaching heart affection is evident at an early stage. Watching the course of a case of foot-and-mouth disease, we are in fact constantly listening to the heart and to the breathing. For here the eventual outcome is decided.

When the second fever has taken its course, the heart symptoms often disappear quite suddenly. Then the animal has overcome the crisis. Or else, the heart symptoms grow worse and worse and threatening symptoms occur. Death most frequently occurs in the way above described, between the fifth and eighth day. There are also cases when the animal appears to recover, but during convalescence suddenly falls down dead. This happens especially in powerfully built animals.

Animals which have passed the crisis, regaining their appetite and beginning to give milk again, suddenly collapse. Dr. Werr once saw a half-year-old calf, while an attendant was giving it water, fall down as though struck by lightning. On another occasion a young cow fell down dead, just as he was about to auscultate it. This death in the convalescent stage – on the fifth or eighth day, or even later – is really a kind of apoplexy. Though the circulation is re-established the degeneration of the heart has gone so far, that sooner or later a sudden collapse takes place. In such cases we often find haemorrhage in the brain between the dura mater and the arachnoidea.

To sum up all that has been said, what is foot-and-mouth disease in its real essence, and what must be the task of a specific remedy for this disease? The disease process consists in this: that the connection between the nervous system with the rest of the organism is interrupted by a disturbance of the rhythmic system. This morbid tendency, if it cannot be brought to a standstill by the reaction of the whole metabolic system, brings about a destruction of the heart – the central

organ of the rhythmic, balancing process. To strengthen the rhythmic system, to re-establish the connection when disturbed, to stimulate the circulation in the nerves-and-senses system and especially towards the brain, to restore the digestive activity to its normal condition – in short, to repair the disturbed rhythm and re-unite the upper and lower systems – such is the task of a remedy for foot-and-mouth disease. Where in nature can such a remedy be found?

Treatment:

The remedy which has the property of restoring the impaired rhythm in the way above described is given us in the seed of the coffee plant. The use of this was indicated by Dr. Steiner. The coffee seed must undergo a special preparation for the remedy to be effective.

We must now indicate the connection between the specific effect of this preparation and the symptoms of foot-and-mouth disease. The effect of coffee is exceedingly characteristic. It shows itself especially in the influence on the brain. Small quantities have a stimulating effect. Our senses become more acute. We find it easier to link together thought with thought. Coffee induces in us a kind of automatic logic, enabling us to think in this way without much effort. "Increased sensibility of sight, hearing, and touch, a powerlessness to check the quick rise of successive thoughts, shining eyes, a hot head, sleeplessness, redness in the face, and a feeling as though one's head were too small for one." Thus an excellent observer, Kent, describes the symptoms of the effect of coffee on the human being.

Larger quantities, as is well known, give rise to congestion in the head, sleeplessness, and migraine-like conditions.

Coffee, indeed, gives rise to cerebral hyperaemia, accompanied by palpitation and quickening of the pulse. Under the influence of excessive coffee, we live with the whole force of our consciousness in the nerves-and-senses system of the head. The cerebral circulation is increased to the utmost.

Coffee has a powerful regulating effect on the digestion. Diarrhoea can be cured by it and constipation relieved. Altogether it facilitates digestion. Hence the beneficial effect of coffee after meals, and in many cases of digestive disturbances.

These effects are well known. But they appear in far greater measure if the coffee seeds have been prepared by the special process referred to above. The effect of coffee is shown in a most interesting way when the preparation is injected into the veins. In the Biological Institute of the Goetheanum we injected it into a large number of bullocks, etc., both in the treatment and prophyllaxis of foot-and-mouth disease and in testing the effect on healthy animals under widely different conditions. When one undertakes an intravenous injection with this preparation one is astonished at the extraordinary powerful effect, an effect which to our knowledge has never yet been described.

We let the warm fluid (at blood heat) flow from the irrigator into the vein. After a certain quantity has passed in (the point at which it happens is 'an individual matter for each animal) we observe, on auscultation, a quickening of the heart beat, which is then followed by an increasing retardation. At the same time the heart beats grow stronger and stronger. At length, when it has slowed down, often to forty or even fewer pulse beats to the minute, it suddenly begins to beat again more quickly. The pulse may then become weak and racing, and we often observe distinct arrhythmia. Even while the pulse is growing slower, there is an acceleration of respiration, and

in many cases the animal snorts audibly. Frequently too, it quivers. As the heart beat become arrhythmic, the Animal stares in an expressionless way. Another constant effect is the passage of water and faeces sometimes during the injection, but as a general rule immediately afterwards. If we now continue the injections, the animal becomes unsteady and begins to sway, especially in its hindquarters. It may then fall down suddenly as though struck by lightning, whereupon the injections should be discontinued. The creature then immediately regains consciousness and stands up. A few minutes later the symptoms have passed, with the exception in some cases of quickened respiration and snorting, which may continue for an hour or two.

These reactions are not shown in their completeness by every animal. There are many varieties according to breed and individual characteristics. Sometimes there is cardial arrhythmia; the heart beat, having been retarded, slowly returns to the normal, the breathing becomes quiet, and further injections even with larger quantities produce no reaction. Sometimes the reaction is small, but snorting and quivering begin two or three hours later. In these cases there are no accompanying heart symptoms and the effect quickly passes over. There is also a great difference in the volume of the injected fluid at which the several phases of reaction occur. Sometimes a small animal needs 40 c.c. and a powerful bull only 20 c.c. The rapidity of injection is also of importance. If injection is very rapid the reaction takes place more quickly and is altogether more intense. But even if the speed of injection is standardized and kept constant through many successive tests, the individual differences occur.

With the large number of injections we have carried out no healthy animal has ever died, nor have any undesirable after-effects or disturbances appeared. The above described reaction gives us a clear insight into the effect of our coffee preparation. What is it that happens?

To begin with the heart: first, the heart beat is quickened, then it becomes retarded. The retardation expresses the preponderating effect of the brain activity, which is stimulated by the coffee. The acceleration of the heart beat expresses a quickening of the metabolism. So we see the heart beat expresses a quickening of the metabolism. We see the heart in quick succession come under the preponderating influence of each of the two opposing systems. First the coffee stimulates the digestion and regulates it, as is shown in the excretions which occur immediately after; then the effect on the brain becomes evident and cerebral hyperaemia sets in. Thus the coffee clearly mediates between the two systems and shows its effects in the very centre of the circulation, in the heart.

The breathing too, is strongly influenced, respiration becoming greatly accelerated. The function of respiration is to establish a balance between arterial and venous blood, between the lungs and the blood circulation. To stimulate respiration is to intensify this balancing process. The brain symptoms show that there is a very powerful influence on the blood circulation in the brain. Moreover, in postmortem examination of cows that had been treated experimentally with a rapid succession of strong intravenous injections, we had occasion to observe an extraordinary excess of blood in the brain. In one case there was even an infusion of blood into the lateral ventricle.

The totality of these symptoms presents the very counterpart of the picture of foot-and-mouth disease. Peristalsis is at once re-established, normal metabolism, which had been impeded, is restored, respiration is stimulated, and the heart itself undergoes a quick process of successive acceleration and retardation – a process which otherwise spread out, as it were, throughout the

whole illness. After this the heart beat becomes regular and rhythmical once more. It is also interesting to observe, as we have often done, the cardiac arrhythmia and murmurs, which had been present before throughout the disease, ceased during the reaction caused by the injections. And though they returned to some extent after the injection was over, the heart was nevertheless in a far better condition than before.

In the intravenous injection of this coffee preparation the essential point is the shock effect which is required to counteract the illness. The injection must be made directly into the blood stream, because it is the rhythmic system, the heart and the blood circulation, which must be influenced as much as possible. A strong effect must be made to direct the circulation from the sick and overloaded heart to the brain.

We made many experiments with subcutaneous injections of smaller quantities of the preparation for foot-and-mouth disease. But in the end the method of intravenous injections proved to be the best, suitable both for the therapeutic and the prophylactic treatment of this disease.

In the pamphlet *Canine Distemper** it is mentioned that the effect of the preparation has nothing directly to do with that of caffeine. The specific effect of coffee is indeed far more connected with the products that arise when the coffee is roasted. This has long been known.† And indeed the above described complex of symptoms produced by intravenous injections is completely divergent from the effects of caffeine. It is the effect of the coffee plant as a whole (i.e., of the seed) with which we are dealing here. The peculiar method of preparation, serves only to intensify the effect of the seed. In the pure alcaloid caffeine we have only a part, and not even the most effective part of the natural process which is present in the plant as a whole, and in its seed. It is the whole process, not the extracted alcaloid, which we bring into the system. It has indeed been insufficiently perceived how frequently nature's processes as a whole are more effective than the extracted or synthetic chemical substance. (See the Chapter about "Vitamins" in this book.)

If the intestinal symptoms are predominant in the epidemic, if we are dealing with the symptoms of the gastro-intestinal form of the disease, if there is abdominal distension and peristaltic inactivity, **the remedy may be given internally as well.** 100 c.c. are then poured in the animal's mouth from a bottle previously warmed. The dose can be repeated if necessary a few hours later. The result is a quick resumption of peristaltic activity, with adequate evacuations. The effect always occurs with astonishing regularity. Of course the remedy must be applied as early as possible, before the serious heart symptoms occur. Much depends on the circulation being revived and diverted before the heart has suffered far-reaching disintegration. One injection is given, and if improvement does not set in at once, or if the condition declines again after improvement, a second is given one or two days later. A third injection will scarcely be necessary. The interval must be at least twenty-four or thirty-six hours; otherwise there will be no reaction. For it is only after this period that the animal once again is receptive in the way above described to the influence of coffee.

In this treatment everything depends on the success of this characteristic reaction. There must be a strong shock effect. This applies above all to the prophylactic injections of which we shall speak below. The remedy is therefore a specific one against foot-and-mouth disease. We recog-

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* Dr. Eugen Kolisko.

† Cf., W. Neumann & Lehmann. "Does Caffeine play a part in the Specific Effect of Coffee ?" Dissertation, Würzburg, 1895. Archive for Hygiene, 32.

nized the essence of the disease in a completely interrupted connection between the nervous system and the metabolism as a whole, with a consequent inflammatory reaction of the whole body, which followed eventually by a destruction of the heart, which is the central organ of the rhythmic system. The peculiarly prepared coffee has to re-establish the broken connection and thus to heal or preserve intact the heart, which is endangered by the illness.

The Preparation of the Remedy

As already mentioned the coffee seed must undergo a special preparation for the remedy to be effective. When we started with the treatment of foot-and-mouth disease we often met with the difficulty .that the remedy was not always of the same effectiveness. Dr. Steiner then pointed out, that the roasting process of the coffee seeds had to go just so far, that a s**pecific change in the protoplasmatic structure of the cells occurs.** Only then the coffee seeds are the remedy for foot-and-mouth disease. That is really the most important point. We started immediately with the microscopic tests and after a long time of investigating into the structure of the cells, having tried many different methods of preparing microscopic cuttings and histological dyes, we had to confess we were unable to find any structural change. At last we asked Dr. Steiner to examine the different microscopic tests and he found some containing the changed structure.

We particularly want to describe here some of the details of the work which had to be done. Rudolf Steiner has been a great teacher of mankind and it is interesting to see how accurate all his suggestions were. We examined carefully the preparation which he said contained the changed structure of the protoplasm – but quite honestly we did not see it. So we had to go on examining the tests, and months went by with microscopic work day and night, still we did not find the change The protoplasm looked more or less transparent to us, with no specific structure at all. Then Dr. Steiner advised us to try the microphotographic methods and enlarge as far as possible. "Maybe the camera sees more than your eyes. Professor Römer in Leipzig will help you to get enlargements up to 3, 000."

With the help of Professor Dr. Römer we succeeded in enlarging the cells of the coffee seeds 3, 000 times. We took many photos in his laboratory at the University in Leipzig, investigated very carefully – but came to the same conclusion: there is no change in the protoplasm. Professor Römer and I were very disappointed that all our trouble proved useless. Then I packed the photos carefully in paper, turning them over and over again before the bright shining lamp and – suddenly, holding the plate at a certain angle to the light, I saw right across one of the huge cells of the coffee seed which nearly filled the whole space of a 9.12 cm. plate, the shadowy outline of a star or cross-like structure. At last we found it. Professor Römer also could see the changed structure. We had made one big mistake in all our investigations. We wanted to see better and better; to enlarge and enlarge the cells; to get the light brighter and brighter – and we just needed a **dimmed** light, falling in at a certain angle. Then I returned to Stuttgart and from that moment I was able to find in the microscopic test the change which makes all the difference if the coffee seeds are to become a remedy for foot-and-mouth disease. Perhaps to-day I would not say that we find a change in the structure. It may be better to say, that the protoplasm seems to have no structure at all, it is transparent; and if the seeds have been roasted to a certain degree – or to express it more clearly – if the roasting process has been interrupted at the right moment, then and only then this specific structure is to be seen in the microscope.

That is the most important part in preparing the remedy for foot-and-mouth disease. **The eye has to be trained to see the change in the cells. No untrained eyes able to find in the microscope immediately** that particular change. Whoever says, that immediately at the first glimpse he does see in the protoplasm stars and crosses and I do not know what else, simply does not speak the truth.

Later on we passed the prescription for the preparation of this remedy to the "Weleda" Company in Stuttgart, but only so far as it is possible to tell the different degrees of temperature which have to be kept during the different stages of the roasting process. Nobody has been trained to make the microscopic test. It takes a long time to train the eyes and we were always prepared to help in this direction. It is essential to repeat from time to time the microscopic test – or else there is no guarantee that the remedy is really effective. – The more so, if for instance coffee seeds of other varieties are used. Then it is quite obvious that the preparation has to be tested, the roasting may have to be interrupted at another temperature.

Previous Views on the Nature and Treatment of the Disease

There can be no doubt that the epidemics of foot-and-mouth disease have grown far more virulent since the seventies of the last century. The symptoms in the inner organs, especially the heart, have come more and more into the foreground. The devastations caused by the disease are indeed immense.

Since it has been recognized as an infectious illness, the whole interest of research has been concentrated on its bacteriology. The greatest care has been taken and endless work has been expended in the effort to discover the specific micro-organism of foot-and-mouth disease. The subject has given rise to an extensive literature, which will not be described in detail here. It is filled in this case, perhaps more than usual, with controversy and polemics. Many authors have sought to isolate the specific micro-organisms in the diseased organs or secretions. Others again have tried to refute these results, proving them inadequate or erroneous. Even the most recent researches on the subject are still a matter of controversy and are being disputed. We think it is justified to pass over these results without further details – important as they are for our knowledge of bacteria and protista – the more so as the method of treatment for foot-and-mouth disease which we are now indicating is the result of a quite different approach.

We are here proceeding from the picture which the disease as a whole presents. This, we contend, gives us the clue to the real nature of the disease. As a remedy we discover a plant preparation, which in its whole effect, and in all its properties represents a kind of counterpart to the picture of the disease. As such it is a true specific.

We look for the essential nature of a disease and thus for its fundamental cause not only in the micro-organism which is found as an invariable accompaniment, or the artificial introduction of which may result in the outbreak of the disease. It is from the disease as a whole that we must seek to discover the true remedy. If the remedy is a true one, in that it really meets the disease process as a totality, then it will also have the property of undermining the conditions of existence of the specific bacteria or other micro-organisms. For these can only live and work harmfully if the disease process as a whole gives them the requisite basis, the proper soil and nourishment.

Hence the remedy described here is a specific one, not in the commonly understood sense of killing the causative bacteria – not indeed in that it is directed primarily against micro-organisms

at all – but because it represents that product of nature which is the effective counteracting force corresponding to the whole process of foot-and-mouth disease, the latter also being a process in nature. For every disease process, there exists in nature some plant, or mineral, or animal process which represents the corresponding healing process, given the right mode of preparation. We must only learn to find it by seeing the disease process and the corresponding nature process together. It is this possibility which is given by anthroposophical science and it is thus, that the remedy has been discovered. Therefore to explain its mode of action, we had to take our start from the disease picture as a whole, and not from the accompanying micro-organisms.

Once more we must repeat, to avoid any possible misunderstanding, that from this point of view, the magnificent achievements of bacteriological research are fully recognized and valued. But it is another question whether the search for specific causative micro-organisms has contributed much to the discovery of a real remedy for foot-and-mouth disease.

As to the methods hitherto employed against foot-and-mouth disease only the serum treatment and serum prophylactic treatment can be spoken of at all, as having been more or less effective.

We will quote here a judgment by Professor Camillo Terni, director of the Experimental Institute for Combating Animal Plagues in Milan. He wrote during last year: "Though they gave good results in the very severe epidemic of 1918-19, the serum and vaccine treatments cannot be adequately applied in practice, because, in view of the high cost of production and other circumstances, it is impossible to provide the immunizing material in sufficient quantities at a given moment. And though experiments with laboratory virus of various origins have given more than favourable results, our surprises during the last epidemic lead us to be extremely cautious in drawing any practical conclusions. We must experiment and experiment again."

On the remedial and prophylactic treatments in general. Professor Terni writes:

"As regards the prophylactic treatments and cures for aphtous fever, we are unfortunately only at the stage of laboratory experiments and can but indicate the way along which our studies will have to proceed."*

With the serum or milk of animals that have gone through the disease once and become immune, and with other sera made in various ways from laboratory virus, short periods of immunity and a certain alleviation of virulent epidemics have indeed been achieved. But the result is by no means completely satisfactory

The scepticism that still obtains as regards the remedial treatment of foot-and-mouth disease is evident from the fact that the law in England whereby the disease is to be combated by wholesale slaughterings still stands.

As to the chemical preparations which have been recommended as remedies for foot-and-mouth disease (and their name is legion) all authors are really in agreement that no single one of them is satisfactory or even nearly so. Atoxyl, iodine preparations, gliarsanil, mallebreine, salvarsane, iron vitriol, lysol, guaiacol, formaldehyde, and many other antiseptics have failed completely. Almost all of these were chosen and sought out with the idea of their having a bactericidal effect. They are not inspired by an attempt to find a specific remedy for the disease process as a whole. But this is what we have tried to do with the preparation here described.

* Terni. *Considerazioni sull'attuale ripressa dell'afto epizo-otica, conferenza tenuta il 23 febbraio alla societa.*

Foot-and-Mouth Disease and Canine Distemper

Readers may wonder that the same remedy, though in a somewhat different method of application, is recommended for two diseases to all appearances so very different: foot-and-mouth disease and distemper. It is necessary to show the reason for this. To do so, we shall however be obliged to describe the contrast, between the two animals so widely different as the dog and the ox, in a way which to some may be a little unfamiliar.

It has by no means been sufficiently observed that every animal develops one organ or system of organs especially and is thus subject to a peculiar and one-sided kind of development. Yet this point of view provides the very foundation of sound zoological theory. Thus it is a most important and fundamental fact that the nervous system is, relatively speaking, far more highly developed and plays a far greater part in the dog than in the ox or bull, for example.

The brain, the spinal marrow, and a number of sense organs, particularly that of smell, are paramountly developed in the dog. A ten times larger proportion of the whole forces of the system is spent on the nervous system and the senses in the dog than in the bull. The functions of the sense of smell alone absorb immensely more of the formative forces of the dog than in most other animals.

Can it be said that sufficient emphasis has been laid on these facts in our study and descriptions of animal diseases? We think not. When we read the usual descriptions of symptoms for two such diseases as distemper and foot-and-mouth disease, for all the difference we can tell in the manner of description, it is as though these two diseases occurred in the same animal, instead of in different animals which are really poles apart. The dog is a creature of nerves and senses. Its digestive and metabolic system is not very much developed. The alimentary canal is only four and a half times the length of the trunk. The metabolism is lacking even in the function of perspiration. Instead of perspiration, the breathing serves to regulate the heat of the body. The dog pants instead of sweating. It replaces the metabolic system by the breathing, which in its centre of activity "lies nearer to the system of nerves and senses, which serves the functions of consciousness, to a far higher degree. This basic fact explains all its qualities and expressions of life. The dog too, is far cleverer and more skilful than an ox. A large proportion of the diseases of the dog are more of the nature of nervous diseases, thus among others, the two most important are, canine distemper and rabies.

The ox is paramountly a metabolical animal. Its digestive system is extraordinarily highly developed. We need only consider the fact that in absolute magnitude the brain of the ox is smaller than that of a man, despite the tremendous bulk of its body. Nature has not spent much on the nerves-and-senses system of the ox. Moreover, it is a dull and unskilful animal. One never heard of an ox being trained to perform elaborate tricks. Altogether the ruminants are not very wide awake. The stupidity of the sheep is proverbial. But, on the other hand, the organism of the ox is truly inventive in the sphere of digestion. Its thoroughness and elaborate character in this respect leaves nothing to be desired. The digestive organism of an ox is a real work of art. The alimentary canal is twenty-four times the length of the whole animal – a marvellously elaborate system of stomachs and intestinal convolutions. How insignificant is the brain of this animal compared to its immense stomachs. The human stomach is not very much larger than the human brain. The ox's brain, on the other hand, could be contained at least twenty times in its stomachs. The legs too, are relatively much developed – strong and massive – and not very mobile. The ox has hoofs

and horns, that is to say, the forces which otherwise work in the system of nerves and senses – giving rise to the sensitive skin – the finely sensitive sense organs and a highly differentiated brain – are here gathered together to produce a thickening of the corneal layer of the skin at six distinct places. We find more of the corneal layer here than in the whole body of other animals. In the dog we have the impression that the organism, though the system of nerves and senses, lives entirely with the outer world. Through smell alone, the dog lives more outside than within itself. It can detect the presence of its master at a great distance. In the ox the opposite is the case. The horns are like a zone of condensation, a hardening of the system of nerves and senses from which all finer forces radiate back and turn inwards. The whole force is spent on the digestion and metabolism. And the tremendous circulation of the blood is placed entirely at the disposal of the digestive function. When an ox, grazing in a field, stares bluntly and reproachfully at the passer-by, as though he were some disturber of the peace, is it not as though the animal would say: whatever more do you expect of me than that I should be digesting and still digesting?

The ox is completely absorbed in the intestinal system, as the dog is in the sense of smell; the one is an animal of digestion, the other of nerves and senses, so great is the difference between them.

When we regard the two animal organizations in this way, and acquire a real feeling of their contrast, we are quite differently prepared for a comparative study of the animal diseases.

In canine distemper a preliminary stage, which points to a morbid affection of the system of nerves and senses, is followed by a universal reaction of the mucous membranes of the sense organs and the respiratory tract. Sometimes, too, it results in a universal exanthema. In foot-and-mouth disease it is the feet that become affected; it is the point where the horny .layer of the skin is, as it were, gathered together and concentrated, in the hoofs. Here, purulent blisters are formed. In this disease the formation of vesicles goes more in the direction of the immensely developed mouth. That is to say, the digestive portion of the head is affected rather than the respiratory tract – though, indeed, rhinitis does occur in the ox; and, conversely, in the dog the mouth becomes inflamed and salivation takes place. Moreover in the ox large vesicles arise rather than exanthema or eczema; and the inflammations are profuse, they are on a larger scale, more massive.

In the dog the danger of bronchitis and pneumonia is predominant, for here the breathing system plays a far greater part. In the ox the blood-circulatory symptoms are the most striking and the most dangerous.

Nerves-and-Senses system. – Centre in the head Breathing system. – Centre in the lungs	} More highly developed in the dog.
Circulatory system. – Centre in the heart Metabolic system. – Centre in the stomachs and intestines.	} More highly developed in the bull or ox.

The reactions in the metabolism of the ox easily pass on into the circulation. The intestinal and stomach symptoms are followed by the heart symptoms.

In the dog, on the other hand, the disease in the mucous membranes of the head, may easily be followed by morbid conditions in the breathing system – by bronchitis and pneumonia.

In both diseases there is a universal reaction of the metabolism in response to the isolation of the nervous system, only this reaction is modified according to the one-sided development of either animal.

Foot-and-mouth disease leads to an affection of the heart. This happens in the ox because in the animal the whole disease process is more inwardly congested. The inner part, the stomach and intestinal system, is far greater than it is in the dog. Hence the greater danger of the affection of the stomach, and above all of the heart. The rhythmic system is attacked at its very centre. In the ox the whole process takes place more downward and inward towards the mouth, belly, feet, and heart. In the dog it is more upward, towards the brain and lungs. In the dog with the more comprehensive brain system, there is eventually a destruction in the brain; multiple centres of disintegration of the brain, spasms and paralysis and other nervous symptoms. In the ox these symptoms are less in evidence, and in place of them we find the centres of disintegration in the heart.

But nature is consistent, and even in the greatest extremes, the common element emerges. Thus in foot-and-mouth disease we find in a rudimentary form the symptoms which are most evident and obvious in distemper. Friedberger and Fröhner in their textbook say: "Small vesicles may also be found in the paunch and the intestines and on the bodily covering as a whole, especially on the breast, on the belly, and even on the cornea." Paralysis, too, is not altogether absent. Here and there we find a weakness of the hindquarters approaching paralyses, as in paralysis of parturition, just as we have the paralysis of the hindlegs in canine distemper Moreover, when foot-and-mouth disease is malignant there are cases of death in which bronchitis and gangrenous pneumonia play a prominent part in addition to the heart symptoms. Conversely in the dog the heart is often affected. There are slight arrhythmic effects, and there is at least a certain palpitation. But the disturbance of the heart is never so far-reaching. Hence, too, the remedy must be differently applied in the two cases. For the dog it is given internally, and in severe cases of nervous distemper by subcutaneous injections. In the ox on the other hand, we must work directly upon the circulation by intravenous injection. We must, in accordance with the whole process in this animal, direct our attack from the very centre.

Eventually it proves that the two diseases, different as they are in external appearance, nevertheless represent essentially the same inner process. They only diverge so much on account of the difference between the two animals. A living study of animal nature enables us to discover this fundamental metamorphosis even in the characteristic morbid symptoms when we really familiarize ourselves with them. For this reason the same remedy has to be applied in the two cases.

To sum up: Foot-and-mouth disease is essentially the same illness in cattle as canine distemper in the dog.

Experiments and Tests

The first tests with the new remedy were made during the 1920-22 epidemic in Germany, especially in Württemberg and Bavaria. We carried out prophylactic as well as therapeutic tests. Unfortunately just at a time, when they had reached a promising stage, all these experiments had to be interrupted because the epidemic died out in our main sphere of work: Württemberg and Bavaria. We had no opportunity of continuing our tests on any extensive scale elsewhere.

Therapeutic Tests

We will try and give an idea of the gradual development of our experiments, which, beginning in a simple way, gradually led to a perfection of the method and a progressive improvement in our results.

I

Our first experiments were carried out on a herd of cattle very severely affected during the epidemic 1920. In this particular village the disease had appeared in its most malignant form, accompanied by the most serious heart symptoms. In many stables a large proportion of the cattle had fallen victims to the disease, and fresh cases of death were continually being reported. At that time we still had to test not only the proper dose, but also the method of applying the remedy. Thus, to begin with, we used subcutaneous injections to a very large extent, and it was only in the further course of the treatment that we had recourse to intravenous injection.

Summing up the results of the first series of experiments, in which 257 animals were injected between the 7th and 31st July, 1920, the following may be recorded.

In the days immediately before we began our treatment a large number of animals in this village had died of severe heart effects daily, and many herds had quite died out. During the following three weeks several stables in which the epidemic was already raging were treated by us, the animals being inoculated with our prepared coffee. These stables belonged to small farmers. The animals which had been under ordinary treatment since the disease began, were now inoculated with our remedy. Thenceforward, in the stables, which we were treating, far fewer fatal cases occurred. Previously, the effects of the disease had been no less than devastating, but of the 237 animals which we treated only 37 ended fatally, i.e., about 16%. Moreover, the composition of our injection fluid had not yet been sufficiently tested at that time; the mode of preparation had not reached its present stage of perfection, and we did many of the injections subcutaneously.

In individual cases we often observed almost hopeless subjects, with the severest heart symptoms, gradually improve, so that they were kept alive.

In a few stables which we had under treatment from the very first, the percentage was considerably better. For instance, in one of them with 21 head of cattle, only one ended fatally. There were similar results in other stables. Encouraged by these preliminary experiments we proceeded with a new series.

II

The next series, carried out in August 1920, on a Bavarian estate in Regensburg, are also to be regarded as preliminary tests. In some cases the animals were only received for treatment on the third or fourth day of the disease, when severe heart symptoms were already apparent. Moreover the preparation of the injection fluid, as mentioned above, was not yet quite perfect. Owing to the severity of the epidemic and the unfavourable conditions, in the one group of buildings where there were 68 head of cattle, 13 = 19% ended fatally. In these stables, in the very first phase of the epidemic before we had begun our treatment, 5 animals had already died through heart attack, so violent was the disease. In another larger stable the result was better; we had the animals under treatment from the very start, and of 124 only 12 died = 10%.

III

A few months later 122 head of cattle were treated therapeutically on the Guldesmühle estate, near Dischingen, in Württemberg. On other farms around, the epidemic, which was exceptionally severe in all that district, had appeared with the most pronounced heart symptoms, and there had been many cases of death. It began on the 11th October, 1920, and went on until about the 25th October taking its course very rapidly. In a large percentage of the animals the heart symptoms were most severe. In cases where these symptoms did not improve directly after the first injection, we injected several times – sometimes even nine or ten times. But as a general rule we gave only two injections, or three at most. Of the 122 cases 8 were fatal = 7%. Five cows died of the severest heart symptoms, and one was slaughtered when the symptoms grew too dangerous. One ox fell down suddenly as it was running along. In short, it was evident that these cases were exceptionally severe. Subsequent experience showed that it is unfavourable to give the injections in too rapid succession, which we did in many of these cases. All things considered, the percentage of animals that died was very small.

The hoof symptoms were often very pronounced and were given the usual surgical and antiseptic treatment. They disappeared without after effect.

A very striking fact was this: the yield of milk, though to begin with, it was reduced by about half, rose again to the normal a fortnight after the outbreak of the epidemic, in very pleasing contrast to the shortage of milk which often lasts for months, as it did for instance, in the neighbourhood of this particular estate.

IV

On another occasion, in July 1921, we had the opportunity of treating a number of animals at Aixheim, a small country place in Württemberg. Throughout the village the epidemic was raging so malignantly as to extend to about thirty farms, and almost every day animals were dying. It was only in five farms that we were allowed to make our injections; of 35 animals which we treated there only 4=9% ended fatally. One of these, a cow, proved to have been badly tuberculous.

Further details of a few of these cases:

(a) Cow Nr. 3 Stable Gratwohl.

14th July, 1921. – Yellow and white piebald, six years, well nourished, quite apathetic. Widespread severance of epithelium in the mouth; heart rhythmical; pulse 80; R. 36. 70 c.c. injected, reaction fairly strong. At 45 c.c. difficult breathing, at 60 c.c. strong retardation of pulse, at 70 c.c. severe dyspnoea, quivering.

15th July, 1921, – Pulse rhythmical; strong salivation.

16th July, 1921. – Heart feebly palpitating; pulse arrhythmic; no appetite.

17th July, 1921. – Heart irregular, with a stop at every twentieth beat of the pulse, A second injection was given, 85 c.c.; strong dyspnoea during injection. Distribution of warmth bad.

18th July, 1921. – Pulse beats complete; small irregularity of heart; slight hoof symptoms.

20th July, 1921. – Still slight irregularity of heart; good appetite; bodily warmth well distributed.

22nd July, 1921. – Heart beat completely rhythmical; appetite good, fully cured.

(b.) Cow-calf Nr. 5 Stable Gratwohl.

Piebald, 2 years, 9 cwt., well nourished. Ill since 13th July, 1921.

14th July, 1921. – Heart strongly palpitating, temp. 105.6; R. 54; pulse 108;
severe aphtous affection of the upper gums. Intravenous injection of 75 c.c. (at 40 c.c. pulse accelerated; at 70 c.c. retarded). General condition bad; eating nothing.

15th July, 1921. – Pulse 84; temp. 162.4; R. 24; heart beat feeble; hoof symptoms present; general condition far better.

17th July, 1921. – Pulse 72; temp. 102.2; R.. 36. Heart slightly arrhythmic. Renewed injection of 115 c.c. (at 30 c.c. pulse accelerated; at 50 c.c. to 100 c.c. slow again; afterwards arrhythmic action; breathing not intense). 18th July, 1921. – Pulse 78; heart still feebly palpitating; considerable severance of epithelium in the mouth. Surgical treatment of hoofs.

19th July, 1921. – Pulse 84; rhythmic heart beat, normal. Aphtae healed; feeling well; general condition, good.

(c) Cow-calf Nr. 7 Stable Gratwohl.

Piebald, ½ year old, weighing 2½ cwt. Ill since 13th July, 1921.

14th July, 1921, – Temp. 103; pulse 90; R. 36; heart normal; whole mouth inflamed. Intravenous injection of 25 c.c. (arrhythmic action at once, then retardation; arrhythmic action grows more severe, the animal falls down and jumps up again at once),

15th July, 1921. – Temp. 104; pulse 90; general condition good.

16th July, 1921. – Temp. 103.6; pulse 90; heart arrhythmic; diastolic murmur; eating nothing.

17th July, 1921. – Temp. 102.7; pulse 84; heart arrhythmic; diastolic murmur; eating nothing. Intravenous injection of 85 c.c. No reaction takes place.

18th July, 1921. – Pulse becomes rhythmical again; appetite not yet normal.

19th July. 1921. – General condition normal.

22nd July, 1921. – Completely cured.

It will be seen from these cases how quickly the heart symptoms react to the injections and how quickly they then recede. Again and again we observed the quick return to the normal yields of milk.

These therapeutic tests unfortunately had to be interrupted, because in the places at our disposal the epidemic declined and ceased. But it is evident how the percentage of fatal cases was considerably reduced as the remedy and the conditions of its application were perfected. Taking the total number of the above mentioned cases of treatment, we find 633, 74 of which were fatal, i.e., 11 per cent. Omitting the first imperfect tests we find 5% fatal cases in the later experiments, though the epidemic was no less severe and malignant than before. The following table may serve to make this clear.

Statistics of the Therapeutic Tests

	Treated	Fatal	%
(1.) Ohmenheim	237	37	17
(2.) Regensburg (a)	61	13	20
Regensburg (b)	124	12	10
(3.) Spaichingen	22	2	9
(4.) Dischingen	122	8	6
(5.) Smaller tests	67	2	3
Totals	633	74	11

It will be seen how the percentage went down in course of time as the remedy was gradually improved.

Prophylactic Tests

Obviously in the treatment of foot-and-mouth disease the very greatest significance will attach to a prophylactic method. With our remedy the point will be, that before the disease sets in, the animals should be made to undergo the above described shock which leads to a sudden change in the whole circulation. This results in a protection against the disease. The rhythmic system, and the connection between the nervous system and the metabolic system, which the rhythmic system brings about, are so strengthened that the isolation of the nervous system which occurs in foot-and-mouth disease is not able to take place.

In our prophylactic tests we began with one injection only, to see if this would give the necessary protective effect. The single injection however, proved insufficient; several injections are necessary for effective protection.

We will first describe two cases to explain the method and the effect:

(1.) Dun Ox, 1 year old. No. 32

Intravenous injection 100 c.c., 70 c.c., 30 c.c., on the 8th, 12th, 13th and 14th August, respectively. Reaction not very strong, very rapid breathing and slowing down of the pulse. 17th August, 1920: The animal was placed in a diseased stable near Dischingen, surrounded by animals suffering very severely. It was infected by abrasion of the tongue and application of fresh infected matter. The animal was kept in this stable till 27th August; it remained well and lively, showed a normal temperature and healthy appetite throughout. No kind of symptoms appeared. The animal proved completely immune.

(2.) Dun Ox, 1 year old. No. 33

Intravenous injection, 150 c.c., 40 c.c., 70 c.c., 120 c.c. on the 9th, 12th, 13th and 14th August, 1920, respectively. Reactions moderate; retardation of pulse and quickening of breath each time. Frequently a slight arrhythmic beat of the heart. 17th August, 1920: The animal was placed in a diseased stable near Dischingen, and infected as the former with fresh material on the tongue. It remained there until the 27th August. No rise in temperature; healthy appetite; remains completely well; no vesicle nor any other symptoms of the disease.

That these cases were not due to an original immunity or one acquired independently of our preparation, is proved by the followings: At the end of October 1920 – two months therefore

after they had remained well in spite of artificial infection – both of these animals had a slight attack of the disease during the epidemic which then broke out on the Gouldesmühle Estate near Dischingen, described above. Both animals became feverish and a few aphtae were formed and quickly healed. Thus they had not been immune, previous to the treatment with our remedy. Moreover, the animals were young, and there was no doubt that they had not had the disease before. By the end of October 1920 the protection afforded by our treatment was no longer strong enough.

We add a third case:

(3.) Dun Ox 3 to 4 years old. No. 17

Five intravenous injections, on the 28th and 29th July, 16th August, 2nd and 7th September, 1920 – 30 c.c., 50 c.c., 60 c.c., 70 c.c. and 100 c.c., respectively. (During the first injection the pulse was irregular and breathing accelerated till 25 c.c. then racing pulse; the animal fell down, but stood up again at once. The other injections gave a feebler, but still a sufficient reaction.) Directly after the last injection, the animal was placed in a diseased stable near Dischingen and remained there for three weeks – until the beginning of October. It was infected with fresh virus in the same way as the last two animals. During this whole time in the diseased stable no rise in temperature nor any other morbid symptoms were perceptible. Afterwards the animal was returned to the very stables in which from 11th to 29th October, 1920, the 122 animals fell ill. There, too, it remained perfectly well. In the case of this animal it could again be proved that it had never had foot-and-mouth disease before.

To improve and develop the protective inoculation still further we tried to arrive at regular periods for the successive injections. We took successive periods increasing in arithmetical progression. Thus we began with an interval of twice 24 hours followed by one of four times 24 hours and finally by one of six times 24 hours. We calculated that the inoculations would then not be following so quickly as to result in the one reaction weakening the other.

After careful investigation to prove that they had never had the disease and were certainly not immune, three animals were purchased and treated with four successive injections at these intervals. They were the following animals:

(a.) Young cow, red and white, 1½ years old.
(b.) Young ox, white blaze, 1½ years old.
(c.) Bull calf, white with red head, spotted behind, 6 months old.

(a.) The previous injections gave the following reactions. The first time 30 c.c. were injected. At 25 c.c. pulse was accelerated, at 30 c.c. racing. After one minute pulse distinctly arrhythmic. The animal swayed about in the hindquarters. Severe coughing.

In the second injection the reaction was feebler, only the pulse was much retarded and the breathing accelerated. The third injection produced a stronger reaction once more, and the last gave a reaction of normal intensity.

(b.) Preliminary treatment produced the following reaction: During the first injection there was already a strong acceleration of the heart beat at 10 c.c. quickly followed by arrhythmic action. The animal fell down, stood up again quickly, and went on shivering badly for a long time. The same process was repeated in the second injection. Even in the intervening time between the first and second and third injections it continued to have a palpitating heart beat, now and then

slightly arrhythmic – a thing that never happened in other cases. During the third injection the animal swayed badly and nearly fell down. During the fourth there was again a severely arrhythmic action of the heart. In the last interval, however, the continued disturbance of the heart beat had disappeared. It will be seen that the reaction was unusually strong in this case.

(c.) The first injection gave a strongly accelerated heart beat already at 10 c.c. At 20 c.c., intensely arrhythmic action was observed. The animal swayed badly and the hindquarters seemed almost paralysed. (It is interesting to observe how, in the reaction artificially induced by the preparation, all the symptoms which otherwise occur in very severe cases of foot-and-mouth disease seemed to be gathered together in one moment.)

In the second injection the same symptoms were repeated. In the third the heart beat was much accelerated after 10 c.c. but at 20 c.c. it was suddenly and intensely retarded. A minute after the reaction ceased, strongly arrhythmic action began. This was followed by an intense quickening of the breath and distension. In the third injection 150 c.c. were given, the animal only swayed and quivered slightly.

This preliminary treatment lasted from the 8th to the 28th February, 1921. At this conclusion the three animals were placed in a diseased stable near Dischingen. They were infected as follows: In each case the inner cavity of the mouth of a badly diseased animal was thoroughly wiped with a handful of hay and the hay saturated with the infected saliva was then eaten by the animal undergoing the test. This process was repeated a second time.

The course of the epidemic was severe in this and the neighbouring stables. From the 2nd to the 5th March the appetite remained good in all three animals, there was no fever, and there were no symptoms in the mouth.

First animal:

6th March, 1921. – Temp. 104.2; a small vesicle on the gum opposite the right canine tooth. (The two other animals were still quite normal, showing no fever and no symptoms in the mouth.) 7th March, 1921. – Temp. 104 and 103.2; moderate appetite. 9th March, 1921. – Some salivation and still a few small aphtae at the edge of the gums and on the tongue.

10th March, 1921. – Feeding quite normal again; aphtae healed; no fever. 11th March, 1921. – Almost cured. 12th March, 1921. – Completely cured.

Second animal:

Not until the 10th March – i.e., a week after the infection did a slight fever arise. 10th March, 1921. – Temp. 102.6. 11th March, 1921. – Temp. 103.8; erosion on the upper gum about the size of a pea; appetite none the less good, and no salivation. 12th March, 1921. – Temp. 102.6. Aphtae gradually healing. 13th March, 1921. – Temp. 102; still healing. 16th March, 1921. – Completely cured.

Third animal:

Fever did not occur until the 11th March. 11th March, 1921. – Temp. 103.6; aphtae on the upper gum about the size of a pin head; appetite completely normal; no salivation. 12th March, 1921. – Temp. 102.4; aphtae no larger and already healing. 13th March, 1921. – Appetite good, condition normal. 14th March, 1921. – The same.

The experiment on these three animals shows that in spite of prophylactic treatment a very slight illness was produced by infection. Nevertheless, the slight symptoms, the fever of short duration,

the appetite which in two of the animals was not at all diminished (it is well known that in other cases the appetite is the first thing to disappear in foot-and-mouth disease) were out of all proportion to the severe illness of the animals surrounding these test cases, from which the infection was taken. Indeed, in the last animal it would have been possible to overlook the slight symptoms of the disease, if we had not carried out very exact observations, registering the temperature in each case and accurately inspecting the mouth symptoms. The prolongation of the incubatory period to eight days and the exceedingly slight, almost imperceptible appearance of the symptoms is especially remarkable. So far as we know, similar results have never yet been attained with any vegetable preparation, or indeed with any preparation other than a serum, in the prophylactic treatment of foot-and-mouth disease.

There is one more instance among our prophylactic tests which we would like to mention in conclusion.

Among the test animals which were purchased under special precautions as above, there were three more which we treated in a similar way. These were young oxen about one year old.

The reactions were rather less than the above described, but still quite satisfactory. To avoid repetitions we can dispense with an exact description of the reactions. In this case, however, we had chosen different intervals between the injections, namely 36 hours, and three times 36 hours, and five times 36 hours. The reason is, that after 24 hours there is frequently no reaction, because the animal has grown accustomed to the effect of the preparation. We have indeed maintained these last intervals as a general rule and we recommend them for further experiments.

The animals were infected in a diseased stable in like manner as before. This was done on the 17th April. In this case it was not until the ninth day that any sign of the disease occurred. On the 25th April minute aphtae appeared; the appetite was lessened for a short time only; salivation quickly ceased. In a word, here too, the symptoms were very slight. The prolongation of the incubatory period seems especially important.

In other cases we endeavoured to treat animals prophylactically a very short time before the illness appeared, not knowing that the animals were already infected.

Here the treatment was really a therapeutic one, applied at a very early stage of the disease. Here too it proved to have an extremely favourable and moderating effect on the course of the disease.

Promising as they were, our prophylactic tests, in which the animals that had undergone preventive treatment were placed in diseased stables, had to be interrupted. We are confident that research workers and veterinary practitioners', interested in our treatment will co-operate with us in undertaking fresh tests and that the result will be further improved when this is done. Probably it will be possible to avoid the appearance even of the slightest symptoms above described. Indeed, this possibility was already realized in the three instances of prophylactic treatment just given above. It may be that it will even be possible to reduce the number of injections, but for the present we do not feel able to recommend a smaller number of injections than the above for prophylactic treatment, and we think also that the 36 hours intervals which we recognized to be the most effective are to be recommended for future use. We hope our tests will provide the starting point for many others.

Brief instructions for treatment with our preparations against Foot-and-Mouth Disease

We will now briefly sum up the results of these experiments in so far as the method of therapeutic and prophylactic treatment is concerned, in order that the mode of application may be perfectly clear.

(a.) **Therapeutic treatment.** – Intravenous injections should be undertaken as early as possible after the disease has broken out. Inject with a graduated irrigator of at least 100 c.c. The liquid preparation is warmed to blood heat and poured from the sterilized and then opened ampoule into the irrigator. The latter is then closed by a ground-in stopper in the form of a glass rod, which may at the same time be the thermometer. A fairly long rubber tube with a tab or clip and an attachment for injection needles is fixed to the end of the irrigator.

The veterinary surgeon should now introduce the needle into the vein of the neck under compression, till the blood flows out in a thin stream. Thereupon the needle is connected with the rubber tube and the glass rod removed from the irrigator. It will be good if at least the head of the animal is held by an attendant, in order that the glass instrument may not be broken by a sudden movement. The fluid is now poured in as soon as the doctor is ready to listen to the heart. The best rate is about 5 c.c. to a second, it can be regulated by raising and lowering the irrigator.

The doctor should auscultate while the fluid is being poured in. On the average, in the majority of cases, the following reaction will occur.

Acceleration of pulse, then after a time increasing retardation. The pulse grows fuller and stronger, till at a certain point the heart becomes arrhythmic. At the same time the eye of the animal grows dim and has a staring expression. There is a lowering of consciousness and often considerable swaying especially in the hindquarters. At this stage one should stop and not let the animal actually fall down,

At the same time there is always more or less acceleration of respiration. If the animal coughs and groans and the breathing is too loud to enable the heart to be heard distinctly in the later phase of the reaction, one should either cease the injection or rely on the other symptoms, such as the swaying, the changes about the eye, and the general impression conveyed by the animal. This will be easy when one has acquired a certain amount of experience.

If arrhythmic symptoms of the heart were present already, the reaction as a whole is still distinctly recognizable as it takes its course. Moreover as a general rule the original irregularity disappears while the fluid is being injected.

The therapeutic inoculation may be repeated two days after at an interval of not less than 36 hours if possible. A third injection may be desirable if the condition has not improved or deteriorated. More ‘than three injections will only be given in exceptional cases.

The **internal use** of the remedy is important especially for the gastro-intestinal symptoms. Particularly in young animals we often find the belly distended, borborygmi ceasing, and constipation setting in. A dose of 100 c.c. per oz. given straight from the bottle often produces a great relief in these cases and an animal which has been completely prostrated will recover very quickly.

When the gastro-intestinal disease is severe and gives rise to diarrhoea, the evacuations frequently containing blood, it is also beneficial to administer the remedy per oz in addition to the injection, though it need not be simultaneously. The dose can be repeated on the next day; and if the condition of the animal seems to make it advisable, it can even be given twice a day.

Prophylactic Treatment

The prophylactic treatment consists in several three to four intravenous injections.

It has proved advisable to give the injections at certain intervals, namely, if possible, an interval of 36 hours between the first and second injection, four and a half days between the second and third, and seven and a half days between the third and fourth, making fourteen days in all.

For the rest, the injections are carried out in the same way as described above for the therapeutical treatment. Such inoculations afford a protection for several months, and there is reason to expect that when the method is perfected this period will be extended.

Microscopic Tests

It would be incomplete, if we did not at least mention, that all our experiments with cattle were also accompanied by blood tests. We studied the blood of hundreds of healthy cows and diseased cattle and of course also the blood of those which had been treated therapeutically or prophylactically with our remedy for foot-and-mouth disease. It was a very interesting study indeed. In the diseased cows we found a severe destruction in the red blood corpuscles, but what interested us most, was the great amount of "blood platelets". This element which we find in human blood as well, is described in many different ways. Some scientists believe that the platelets are part of the megaloblasts (i.e., an erythroblast or primitive red blood corpuscle of large size, found in the blood in pernicious anaemia and predominant type of nucleated red cells in the bone marrow of patients with pernicious anaemia during relapse), this is the theory of Wright; others think they are the last physiological remains of the nuclei of young red blood corpuscles (theory Schilling). "The platelet's nature and physiologic role are still obscure, but they probably play a role in the clotting of blood." This statement we find for instance, in the excellent *American Illustrated Medical Dictionary* (Philadelphia and London, W. B. Saunders Company, 1941). Very often we found in the blood of the diseased cows and especially after the injections with our remedy these elements. They have the form of round or oval discs containing in the middle one or more purple granules. The disc itself is colourless, transparent. The outside membrane absorbs the red colour out of the "Giemsa" solution, which is especially recommendable for dyeing these elements of the blood. We find various types of platelets in human or animal blood. Some have not at all the above described clear hyaline disc, they seem to consist mainly of purple granules, some may still show a surrounding red circle, some seem to have split the membrane and clot together as amorphous heaps of granules, or we find only free granules. As mentioned before, there are many divergent opinions about the character of blood platelets in science and somehow we found it quite impossible to think that these well-defined corpuscles could be part of the nucleus of a red blood corpuscle, or part of some megaloblast of the bone marrow. Since we found such an enormous amount of clear, hyaline elements, with only one tiny purple grain in the centre especially in those tests taken immediately after the injection with our remedy for foot-and-mouth disease, we took the opportunity to ask Dr. Steiner about these strange elements. Dr. Steiner looked at the tests with great interest and gave the following explanation: "These corpuscles are a hormone of the spleen. They might be called **regulators**. The spleen is an organ which has the task of regulating the rhythm of the metabolic system. You can also find these elements in the human blood. For instance, if you would undertake to disturb the rhythm of the metabolic system, then you will find those ' regulators' in the blood. Ask somebody to have instead of three meals a day, five

meals; and the following day only two meals and again the following day perhaps seven meals. It must not be much. But always when food is taken, the spleen has to balance the rhythm in the metabolic system. If there is a disturbance arranged so that you have more meals on one day and less another day, and again more on a third day – then you will find that hormone of the spleen in the blood."

We found this explanation of great importance, because since the oldest times the spleen has been considered to be a "mysterii plenum organon". Nobody knows why it is necessary for us to have a spleen. The spleen may be removed entirely and no function of the organism seems to be disturbed. In antiquity it was even customary to remove the spleen from those people who were carrying messages, the "courrirs". Everyone knows, if we run too fast or too long, then we begin at first to pant, and afterwards we get pains in the left side – the spleen begins to ache. Well, then, if the spleen has nothing specific to do, and only causes pain if one has to run – take it out.

That is the second task of balancing which the spleen has to fulfil in **the rhythm of the respiratory system**. We can only stand a certain amount of disturbance in the respiratory system – at first we try to make up for it by panting, then the spleen is asked to do more than this organ can stand and we feel the pain in our left side. This should of course be considered as a signal of danger – we should cease to run – and not be so absurd as to remove the warning organ from our organism.

Much could be said about this interesting problem, but we must limit ourselves here, and only mention that we studied this object thoroughly. About thirty people were good enough to help with these researches. They received detailed prescriptions for their meals. Of course we made a blood test before starting the experiment, and only those were suitable to undergo the test who did not show the "regulators" in their blood beforehand. E.g., if somebody leads an irregular life, just eats when he feels an inclination to do so, then he has already a disturbed rhythm in his metabolic system. Such a person has at first to be treated with regular meals for some time – at least a week. Then the blood is free from "regulators". We can again cause an interference – and the "regulators" appear. It is a highly interesting study; now we are able, by making a simple blood test, to diagnose if the metabolism is in perfect rhythm, or if there is a disturbance. These experiments were published as the first work from the Biological Institute at the Goetheanum in 1922.*

Another very important point is that those "regulators" may be found in the human blood also, if there is no irregularity with regard to meals. It is possible to find somebody who really adheres strictly to meal times and never has more than three meals a day at the fixed hours, and yet has "regulators". In this case we found that such persons always drink excessive quantities of strong coffee.

When we injected our special coffee preparation into the diseased cows, we described how the breathing is affected during the injection, the cows begin to pant – the remedy affects the rhythm of the respiratory system; then defaecation takes place during the injection, or immediately afterwards – the metabolic system has been affected – and in the blood we find the "regulators".

We stated (see page 356) that the function of a remedy for foot-and-mouth disease is to repair the disturbed rhythm and to re-unite the upper and lower systems.

Coffee has this capacity in the highest degree if it is prepared correctly.

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* L. Kolisko, Milzfunktion und Plättchenfrage, 1922, Stuttgart.