that the unilobular cirrhosis was that of Hanot's disease, but the intralobular was much more prominent than that regarded as characteristic of that condition.

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THE INFLUENCE OF OVERCOOKING VEGETABLES IN CAUSING SCURVY AMONG CHILDREN.*

BY

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(Report to the Lister Institute and to the Medical Research Council, London.)

In April, 1919, 40 cases of scurvy occurred among the 64 children from 6 to 14 years of age under treatment for tuberculosis in the University Kinderklinik, Vienna (Professor C. v. Pirquet).

The first case, observed on April 12th, had pain in the jaws, swollen, tender, and discoloured gums, and later swollen and tender knees. On April 14th two more cases were reported and developed symptoms of the same severity. Subsequently 37 fresh cases occurred, the last on April 28th; in all of these the symptoms were mild and confined to gums and jaws.

From April 18th to April 28th 45 lemons were provided daily for the 64 children in the section, and extra spinach, "Kraut," and raw onions were added to the diet. The scorbutic patients received also a preparation made by boiling pine tree needles in water. After April 28th extra supplies of fresh vegetables were obtained. In all cases the symptoms subsided in ten days, and in most in four or five days. In the majority of cases the weight charts show a temporary arrest in growth during the attack, but in no instance was there any evidence of a prolonged retardation.

The admirable arrangements of this hospital render the outbreak exceptionally favourable for study. A very accurate system of calculating food requirements has been elaborated by Professor v. Pirquet, and, as far as calories are concerned, each child has always received enough without any excess. The unusually complete records of diet which are kept as a routine measure permit of detailed analysis, and the average amount of each article of diet taken by each child can be accurately determined. Singularly full records are also kept of the growth in size and weight and the general condition of the patients, all of which were placed freely at our disposal by Professor v. Pirquet and his staff.

At the time of the outbreak there was no corresponding prevalence of scurvy in the general population, and the conditions which determined its onset have to be looked for inside the hospital and primarily in the food.

Analysis of Diet.

The articles of food consumed in the Tuberculosis Section of the Kinderklinik have been classified into:

(1) Those known to possess slight value or none for prevention of scurvy—flour, oats, barley, eggs, cheese, condensed milk, lard and other fat, dry beans and peas.

(2) Those possessing marked antiscorbutic properties—green vegetables, potatoes, other root vegetables, fresh meat, and fresh milk.

The comparative values of the foodstuff under (2) are given in Table I below. The figures are based on quantitative experimental work carried out at the Lister Institute on guinea-pigs and monkeys.¹ In many cases the

TABLE I.—Showing Comparative Antiscorbutic Value of Equivalent Weights.

Fresh lemon or orange juice, raw ...	100
Fresh cabbage leaves or expressed juice, raw ...	100
Fresh cabbage leaves, cooked at 100° C. for twenty minutes ...	30
Fresh cabbage leaves, heated 70° to 80° C. for sixty minutes ...	10
Fresh swede turnip juice, raw ...	60
Fresh tomatoes, raw ...	60
Fresh green beans, raw ...	30
Potato, cooked at 100° C. for thirty minutes ...	7.5
Fresh carrot juice, raw ...	7.5
Fresh beetroot juice, raw ...	less than 7.5
Fresh beef juice, raw ...	less than 7.5
Fresh cow's milk, raw ...	1 to 1.5
Dry beans, peas, lentils, etc., raw ...	less than 7.5
Germinated beans, peas, lentils, etc., raw ...	30

* A more detailed account of this investigation is being published in the *Zeitschrift für Kinderheilkunde*.

values have been confirmed by recent therapeutic trials in Vienna on infantile scurvy (Barlow's disease). The values of the fresh materials are, of course, much diminished by the ordinary procedure of cooking.

The possible influence of meat has been disregarded in the present investigation. Even when raw its antiscorbutic value is small and it must be consumed in very large amounts—for example, 500 grams and upwards per person daily²—if scurvy is to be prevented by its agency alone. During the six months preceding this outbreak the weekly average per patient was less than 300 grams. We do not consider either that fresh milk has played any important part as an antiscorbutic in the present instance. At the best its antiscorbutic value is low, and owing to disorganized transport it was almost certainly heated twice before reaching the children. Up to the end of January, 1919, the average daily ration was never more than 250 c.c.m., and during February and March this steadily declined to about 30 c.c.m. More condensed milk was then used, but the value of this product is even less than that of fresh unheated milk. No fruit was taken. The average consumption of green vegetables, potatoes, and other root vegetables is given in Table II. The outstanding feature of this analysis is the deprivation of the most effective antiscorbutics after the middle of February. During the autumn of 1918 there appears to have been a generous provision of green vegetables, potatoes, etc. This was on the whole maintained during January, 1919, but there was a great falling off in February, which became still more marked in March.

These data appear to show clearly that a daily ration of about 80 grams root vegetables is insufficient to protect from scurvy, and we are of opinion that the marked shortage of all vegetables during the eight weeks from the middle of February to the middle of April was the immediate precipitating cause of the outbreak. If, however, this were the whole explanation, it is remarkable that such a short period of deprivation should cause widespread recognizable scurvy. For adults the necessary period has been fixed at from four to eight months, and oftener perhaps nearer the longer time.³ For children there appears to be no definite information beyond the fact that symptoms are rarely seen in infants less than 6 months old.⁴ It is not unlikely that the period for children is less than that for adults in correspondence with their greater metabolism, but there do not seem to be any grounds for taking it as shorter than four months.

TABLE II.—Average Daily Consumption by each Patient in Grams.

Date.	Green Vegetables.	Potatoes.	Other Root Vegetables.	Total Vegetables.	Milk.	
					Fresh.	Condensed.
1918.						
September-October ...	102	114	15	231	188	30
November-December ...	62	110	62	234	225	16
1919.						
January ...	30	130	68	228	190	112
February (first half) ...	0	55	92	147	33	215
February (second half) ...	0	0	101	101		
March ...	0	0	77	77	28	105
April (first fortnight) ...	12	1	53	66	0	80

In the present instance the allowance of vegetables up to two months before the first cases appeared was more than 200 grams daily, which is not less than is usual in many private households during the winter, and may be expected to prove adequate for prevention.⁵ A similar allowance, 250 grams daily fresh vegetables, is a common ration for soldiers on active service, and instances must be numerous in which this amount has failed temporarily without appearance of scurvy in so short a period as eight weeks. In the present case, therefore, the antiscorbutic taken in the previous months should have enabled these children to withstand eight weeks of comparative deficiency. It did not do so, and we are forced to conclude that while the supply of vegetables was adequate the supply of antiscorbutic was defective.

The explanation seems to lie in the method of cooking; this process destroys the antiscorbutic vitamine in proportion to the time and temperature of heating. The time of cooking is in general more important than the temperature, and it has been shown that quick heating at 100° C. entails less destruction than prolonged simmering at 70° to 90° C.⁶ Outbreaks of scurvy in which excessive cooking of the vegetable ration has been considered an important contributory cause have been already placed on record.⁷

By the kindness of Professor v. Pirquet, and with the help of the sister in charge of the kitchen, we were enabled to study the methods of cooking employed in the kitchen of the Kinderklinik.

In cooking for institutions, where large numbers of people are concerned and large quantities of food have to be manipulated, the time taken in cooking must of necessity be much longer than is the case in small households. In Vienna, moreover, the usual method of preparing vegetables involves two separate cooking processes: they are first boiled till soft, and afterwards cooked again before serving, in an "Einbrenn" made from flour and fat. This double cooking involves a twofold destruction of antiscorbutic vitamine.

Similar methods of cooking vegetables have been employed in the kitchen of the Kinderklinik. Even potatoes are frequently twice cooked—first boiled or cooked in steam at 100° C., then sliced and cooked again with fried fat and onions. In the making of soups the root vegetables, tomatoes, green vegetables, etc., are subjected to a temperature of 90° to 100° C. for as long as three to four hours as a general rule. Following such methods of cooking, the loss of antiscorbutic value must be very extensive, if not almost complete. It is probable, therefore, that during the period (September, 1918, to February, 1919) when an adequate amount of fresh vegetables was provided, the diet nevertheless was a scurvy-producing one, due to loss of antiscorbutic vitamine during the cooking.

It would be easy to introduce slight modifications into the method of cooking which would avoid much loss of antiscorbutic material and would not alter seriously the present manner of preparing the food. The following are examples:

1. *Soups*.—In the making of soups the vegetables are first cut in small pieces, placed in water, and the whole cooked together for three or four hours. If green vegetables are used, or fresh tomatoes, as in "Kohlsuppe" or "Paradeissuppe," these also are subjected to the whole period of cooking. An improved method would be to add the sliced cabbage or the tomatoes, etc., shortly before serving the soup, so that the cooking should take place for as short a time as possible. When fresh fruit and vegetables are scarce it would be an excellent plan to grate the root vegetables and press out the juice, and to boil the dry pulp with the other constituents of the soup for as long a time as is needed, reserving the raw juices to be added just before the soup is served.

2. *Green vegetables* (Kochsalat (cos-lettuce); Kohl (cabbage), etc.) are washed, placed in hot water, heated to boiling point and kept at 90 to 100° C. until soft (about 1½ hours). The water is then poured off, and only a little retained to add to the finished dish. The cooked greens are minced, heated a second time with an "Einbrenn" made of flour, bacon fat, onion, etc., water being added to make the right consistency. It would be better to steam the green leaves instead of cooking them in boiling water. The time of cooking could probably be shortened to twenty to thirty minutes, and the loss of antiscorbutic and other vitamins in the water (which is not consumed) would be avoided.

Germinated Seeds.—The use of germinated peas, beans, lentils, or other seeds as supplementary antiscorbutic materials where there is a shortage of fresh vegetables cannot be too strongly urged.

The method of preparation is as follows: The beans, peas, etc., are washed in water and left to soak for twenty-four hours at room temperature. They are placed in layers not exceeding 5 to 7 cm. in depth upon an ordinary kitchen sieve or other porous surface. They are kept moist by occasional sprinkling with water and with free access of air for 48 to 72 hours. At the end of this period rootlets varying from 0.5 to 1 cm. in length should be visible. The germinated seeds should not be allowed to become dry again, but should be cooked immediately. The cooking should be for as short a time as is necessary to render them soft and palatable. Placing in water for half an hour and then boiling for ten to fifteen minutes should suffice for small seeds such as peas and beans.

The antiscorbutic value of this germinated material has been determined by means of experiments with animals (guinea-pigs) and has been found, weight for weight, to

possess about one-third the value of cabbage leaves in the raw condition.⁸ It has also been successfully used in the prevention and cure of human scurvy.⁹ It is interesting to note that dry peas, beans, and "czirok" formed an important article of diet in the tuberculosis ward during the whole period under investigation. In the three months previous to the outbreak an average amount of 33.5 grams were consumed daily by each child. During the time of greatest dearth—that is, the eight weeks immediately preceding the outbreak—a daily average of 30 grams per head was consumed. When dry these pulses have a negligible antiscorbutic value, but had they been given in the germinated condition the ration of 30 grams would have represented the equivalent of about 60 grams of fresh vegetables, if not spoilt by overcooking. This extra allowance would have been of inestimable value in preventing the outbreak.

The incidence of scurvy in relation to the length of residence in hospital is of some interest, the children who had been in hospital for a longer period being affected a good deal more than the recent arrivals.

TABLE III.

Group.	Residence in Hospital.	Number.	Scurvy Symptoms.	Per Cent.
A	6 months or more ...	17	16	94
B	3 to 6 months ...	21	12	57
C	Less than 3 months ...	26	12	46

It has been pointed out above that the children in Group A had probably suffered long relative deprivation of antiscorbutic owing to the methods used in cooking their vegetables. The same conditions did not apply to Groups B and C, though it is certain that these children suffered deprivation in their homes before entering hospital, for the whole city was reduced to a food supply meagre in quantity and of the poorest quality during the winter 1918-1919, and fresh food was specially scanty. It is, indeed, remarkable that the conditions as regards scurvy were apparently less satisfactory in hospital than among the general population. Among the latter there was certainly no general outbreak of scurvy, and the children who had been but a short time in hospital were less disposed to develop the disease when the acute shortage of antiscorbutic came than those who had been in longer. The presumption is that during the six months or so preceding the outbreak the general population were getting more antiscorbutic than these hospital patients.

The possibility that admission to hospital precipitated the onset of the disease in Groups B and C is also worth consideration. There is considerable evidence that the demand of the body for antiscorbutic is in proportion to the rate of metabolism. In Group A the weight charts are very uniform and normal for seven months before the outbreak and show a normal rate of increase. Groups B and C, on the other hand, are composed of children who on admission were much below the normal age weight owing to general underfeeding. The diet of the Klinik, ample in calories, led to abnormally rapid growth, and this may well have had something to do with the onset of scurvy.

SUMMARY.

1. An outbreak of scurvy in April, 1919, affected forty children out of sixty-four aged between 6 and 14 years under treatment for tuberculosis.
2. From September, 1918, to February, 1919, a good supply of fresh vegetables and milk was available. From the middle of February to the middle of April the daily ration of fresh vegetables was reduced to about 80 grams per head; deprivation was never complete.
3. The eight weeks' period of shortage preceding the outbreak is a much shorter period than the four to six months noted by other observers as necessary for the development of scurvy.
4. It is concluded that though the supply of fresh food was adequate, the diet was nevertheless a scurvy producing one, and that the period of deprivation of antiscorbutic was longer than it appeared to be.
5. An explanation is found in the method for cooking food employed in the hospital which involves a serious

* A sort of buckwheat.

destruction of antiscorbutic. Suggestions are made as to means of preventing this.

6. The germination of dry peas, beans, and lentils before cooking is strongly recommended as a means of providing extra antiscorbutic when fresh vegetables and fruit are scarce or absent.

7. It is suggested that abnormally rapid growth may promote the development of scurvy in children.

In conclusion, we desire to express our gratitude to Professor v. Pirquet, who placed all his valuable records freely at our disposal, and to the members of his nursing staff who assisted us in every way in our investigations.

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TWO CASES OF CARCINOMA ALIVE EIGHT YEARS AFTER RADIUM TREATMENT.

BY

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ONE hears a good deal about apparent cures of cases of carcinoma by radium, in reports written soon after the treatment has ended, but little of what happens to these patients afterwards. The following two cases were seen eight years and one month ago, and radium treatment was started almost immediately.

CASE I.

In July, 1912, a man of 61, who had previously enjoyed excellent health, but was a heavy smoker and took alcohol fairly liberally, sent for me because he had noticed a swelling on the right side of his neck. He also complained that for some months he had had some irritation of the throat, and was continually expectorating small amounts. A hard indurated ulcer with everted edges, of about the size of a shilling, could be seen and felt below the right tonsil. The swelling in the neck was a large mass of hard and fixed lymphatic glands. He was seen by various surgeons in London and the provinces, and all agreed in the diagnosis of carcinoma of the pharynx, quite beyond operative interference.

In spite of the poor results obtained by radium in cases of carcinoma of the pharynx, I determined to give it a trial. I started by giving two applications of radium a week from the outside of the neck, and continued till the skin could stand no more without risk of ulceration, when I lessened the amount of radiation. The whole side of his neck was radiated as far down as the clavicle. At the end of a month there was a decided improvement, both of the primary growth and of the glands.

At the end of six months all signs of disease had completely disappeared. Notwithstanding this, I continued to apply radium about once a week with a few short intervals, when the patient or myself were away, for another six months. He had his last application in July, 1913. Since then he has had no signs whatever of any recurrence, and to-day, eight years after, at the age of 69, he is in excellent health, and able to lead a busy life.

CASE II.

A lady, aged about 60, complained in July, 1912, of a swelling in her right breast. It presented the usual signs of scirrhus carcinoma, and was adherent to the pectoral fascia. There were hard glands in the right axilla, but the supraclavicular glands appeared normal. The right breast was amputated and the axilla cleared.

A piece of the growth from the breast and the whole of the mass of glands and connective tissue removed from the axilla were sent for pathological investigation. The report was that the tumour was a scirrhus cancer, and that not only did the axillary glands exhibit signs of secondary infection, but the fat of the axilla also was largely permeated by cancer cells. It was apparent, therefore, that it was impossible for surgery to have removed the whole of the diseased structures, and as soon as the wound had completely healed I started radium treatment. The whole of the axilla and right side of the chest was rayed, and this was repeated till the skin showed signs of intolerance. Treatment was not left off till July, 1913. During this time there were no signs of recurrence. In November, 1913, a small swelling appeared over one of the ribs near the scar, suspiciously like the commencement of a recurrence. Radium treatment was resumed forthwith, and the swelling soon subsided. I continued applying radium till May, 1914.

She has remained free from symptoms till lately, when she

complained of a cough, and I found rhonchi and râles over the chest, more marked on the right side, but no bronchial breathing. I also think I can detect some enlargement of the liver, but she is stout and the abdomen is difficult to examine. She is a sufferer from rheumatoid arthritis, and is too infirm from this to be willing to undertake a visit to have her chest x rayed, so the diagnosis remains in doubt, but the signs are very suspicious of a recurrence in the lungs and liver.

From the above notes I think it can be fairly claimed that Case I has probably been cured by radium, and Case II has to thank radium for eight years of life, though the chances are that she is after all going to succumb to carcinoma.

If more observers would publish the late results of similar cases that they have been able to follow, it would much help our knowledge of this important subject.

SODIUM BIBORATE IN THE TREATMENT OF EPILEPSY IN AN ASYLUM.

BY

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ON the male side of this institution there are about 60 epileptics, or 11 per cent. of the total number of male patients. The majority are chronic cases, and a large number of them have been resident for many years.

Formerly the routine treatment was a large dose of potassium bromide (gr. xxx) night and morning. Examination of the ward books, in which a record is kept of all fits in epileptic patients, shows that this has had little effect in reducing the number of fits or bringing about any mental improvement. The only change noticeable was a lessening of excitability and an increase of mental confusion.

Sodium biborate is mentioned in medical textbooks as an alternative to potassium bromide. Eight months ago I decided to try a mixture containing potassium bromide and sodium biborate. The treatment was commenced on December 27th, 1919, on the patient J. D. quoted below. The results were so striking in his case, after a fair trial, that it was decided to apply the treatment more widely. The benefit of the treatment has been very marked in all the wards; in two, where the treatment has been in use for four months, the fits have been reduced by 64 per cent., and in two other wards in which the treatment was commenced about six weeks ago there has been a reduction of 68 per cent., and that amongst patients who formerly had fits at regular intervals. It is interesting to note that in the male hospital four of the patients have had no fits since commencing treatment about July 20th. Previous to treatment, three of them never went longer than eight days without having fits, and the other averaged twelve days and then had a bout of from three to five fits.

The following three cases may be quoted as striking examples:

CASE I.

J. D., aged 40, admitted March, 1918; Wassermann negative. From admission until treatment was started the patient was subject to violent uncontrollable attacks of excitement at intervals ranging from three to five weeks. These attacks lasted from one to seven days; the more violent the outburst the shorter the duration. Sedatives had very little effect, and his violence was such that frequently at night attendants were on special duty at his bedside. He also suffered from auditory hallucinations and delusions of suspicion. Since the commencement of treatment, in December, 1919, these outbursts of epileptic furor have disappeared entirely. The fits have been reduced by about 65 per cent., and this in spite of lapses in the treatment of three weeks at one time and two weeks at another. These intervals without treatment were tried to see the effect of stoppage, and in each case the fits returned. His mental condition has improved. There is now no stupor after a fit, and the patient states that he now "feels his head clear."

CASE II.

J. F., aged 33, admitted May, 1917; Wassermann negative. This patient states that he started to "take turns" when he was 11 years of age. On admission he was irritable, quarrelsome, and very impulsive. He was a most troublesome patient, and had fits regularly and in bouts. Treatment was commenced on April 5th, 1920, and his fits have been reduced 86 per cent. He has had none since May 6th. Mentally he is clearer, his memory has improved, he gives no trouble, and now expresses the desire to be allowed out to do some work.