

On scurvy : as it appeared in the allied armies during the late war with Russia / by S.D. Bird.

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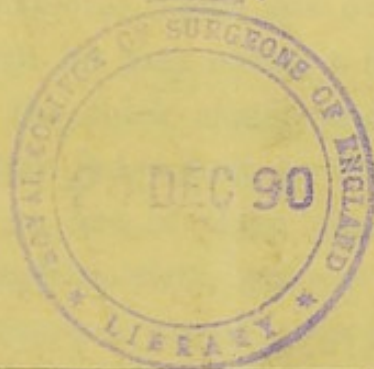
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AS IT APPEARED IN THE ALLIED ARMIES DURING
THE LATE WAR WITH RUSSIA.

BY

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ON SCURVY AS IT APPEARED IN THE ALLIED
ARMIES DURING THE LATE WAR WITH RUSSIA.

BY S. D. BIRD, M.R.C.S., &c.

THE investigation of the nature and treatment of disease, is, as we all know, a study beset with difficulties of no common kind, and as we enlarge our experience, so we are only the more able to appreciate how small the real extent of our knowledge is. But, amidst the vast ocean of doubts and uncertainties to which we commit ourselves when we commence the study of medical science, there are certain great beacons or landmarks, few indeed, and far between, but still, both guides to let the explorer know his own whereabouts, and eminences from which he may obtain a better view, and peer a little farther into the thick clouds and darkness that surround him, and better judge how to direct his course to the desired end. It is to one of these observatories, lofty, and commanding an extensive view, but out of the beaten track of tourists, that I propose to conduct you by this essay. Those better known to all of us, are the starting points of the known effects of certain remedies, such as quinine, arsenic, iodine, and so on, and the influence of vaccination over the small-pox. It is in such examples that the science of medicine has achieved its greatest triumphs. But in all these we arrive at a certain point, and then are brought to a stop. We know that by giving quinine to a man with ague, we are as directly attacking the disease as the fireman who sends the stream

from his engine against a burning house, but why the quinine should be so bitter against the ague, and why and how it drives it out, we cannot tell. Neither the Apothecaries' Company, nor the more aristocratic, though perhaps not more sapient, Board in Trafalgar Square, nor even the graduates of the University of London, who are supposed to possess almost a superhuman amount of knowledge, can give the enquiring student the slightest hint as to why the vaccine pustule should make a man less likely to take the small pox—yet so it is. But there is one disease in which medical science goes a step further, of which we know the one and only cause, and its sole remedy, how the first is brought about, and how the latter acts; we can produce it and cure it at will, for if we put a person, under certain conditions, we are as sure that he will have certain symptoms, as the navigator, that he will come into the trade winds in a certain latitude, or the chemist that he will have such and such reactions from known agents. We deprive a man of the food which contains a normal constituent of his blood, and certain symptoms follow, we examine his blood, and find this constituent absent, we restore it to the food, and the symptoms disappear! Here is the nearest possible approach to perfection, both in pathology and treatment. The discovery of the deficiency of iron in the blood in anæmia set all the physiologists in Europe a thinking, but the rationale of the treatment of scurvy, though so much more perfect, has not received a like amount of attention, though the field for investigation that it brings to light, is almost unlimited. The reason of this is, that happily for the world in general, scurvy is a disease very little seen, and less recognised in ordinary practice, most people having pretty much the same notion about it that I had before seeing a case, namely, that it was “something wrong

about the gums," but having no notion of the terrible nature of the disease, and the frightful ravages it commits.

There are hundreds of men who, in a practice of twenty or thirty years, have not seen a well-marked case, and in fact to the bulk of the profession the disease is only known in books. Our distinguished Professor of Medicine has written in the "Library of Medicine" the best account of the disease extant, but even this is the result of an experience of isolated cases seen in the Dreadnought Hospital. I think I may safely say, that no Englishmen during the present century have had so large an experience of the disease in its worst forms, as the Staff to which I belonged during the late war. For it is only when large bodies of men are dieted for a lengthened period, regardless of the fact that fresh vegetable food is absolutely necessary to health, that scurvy appears epidemically. The ships of all civilised nations are now obliged to take lemon-juice, their armies are never without fresh vegetables for any length of time. Prison-diet is now superior to that which nine-tenths of the honest population get in their own homes. The Turkish Government, however, sent their troops to the Crimea regardless of this fact of the necessity of fresh vegetable food. Their men were tolerably clothed, their tents were better and drier than those of the English or French; their camp at Eupatoria was on a healthy, gravelly soil; they fed on good sound biscuit, boiled rice, fresh-meat twice or three times a-week, salt-meat was unknown amongst them; they had their coffee and their pipes; they were not overworked or idle, and were in excellent spirits at having beaten the enemy; and yet I found on examination that on an average three men out of four on duty in the spring of 1855 were more or less affected with scurvy, and the hospitals were crowded to suffocation. I will say no more than this to show you that

the whole and sole cause of scurvy is the want of fresh vegetables, totally irrespective of all other considerations, though other circumstances, such as cold, wet, anxiety, bad air and so on may aggravate the complaint, and bring on its more serious complications. Thus, when a man got so ill as to be unable to perform his duty, he was sent to hospital. Now the Turkish hospitals in Eupatoria were as bad as bad could be, and under the combined influences of low crowded rooms, the fumes of charcoal, the effluvia from the wounds of other patients and from cases of fever and dysentery, the horrible stench from the mouths of other scurvy patients, and a continuance of the same diet which caused the disease, simple cases soon degenerated into the more malignant forms, combined with sloughing ulceration, fever, and colliquative diarrhœa. For these symptoms the Turkish hakims gave mineral acids, detergent gargles and decoctions of dried herbs. The mortality in these pest-houses may easily be imagined; it was 80 to 90 per cent. on the admissions. When I tell you that $\frac{5}{6}$ of the cases admitted into hospital were scurvy, you may form some notion of what a fearful malady it is, when neglected, as regards fatality.

Scurvy may be taken as the type of a blood disease, but differing from most others of this class, in the fact that its effects are due to no want of assimilating power in the system, but to a defect in the food; the material from whence the blood is primarily supplied. This defect has been proved by demonstration to be the want of certain vegetable acids, principally the citric and malic, in the formation of salts in combination with potash and soda. The most characteristic effect of this peculiar state of the blood, is a remarkable tendency to extravasation during its passage through the capillaries, effusions either of serum alone, in the form of œdema, or by

actual rupture of vessels, of the fibrine and colouring matters. As might be expected, we find these effusions in the tissues most freely supplied with blood, and more particularly in the mucous membranes, and their subjacent areolar tissue. These tissues are both highly vascular, and also, in general, so lax, and so little confined by the surrounding parts, that any disease affecting the blood primarily, has full scope for its destructive energy.

Now I will not inflict upon the Society a serial catalogue of the manner in which scurvy affects each organ and tissue of the body, but I will just draw you a sketch of a well-marked ordinary example of the disease, and will then proceed to notice some of its more extraordinary features. We find the patient with his muscular system of his lower extremities so completely prostrated, that he is utterly unable to stand, though his pulse is tolerable, and the primary functions of the brain and nervous system are perfectly performed. His complexion is of a peculiar greenish yellow, tallowy hue, almost indescribable, yet most characteristic when once seen. The only comparison I can think of to give you an idea of it is that of a *very* dirty girl with chlorosis. One side of his face is so swelled, that he looks as if he had an apple in his mouth, and the cheek is one large purply green blotch of ecchymosis, extending up to the eye. That eye would, I think, puzzle many of the learned ophthalmic surgeons if they saw it for the first time. The whole conjunctiva is in a state of "coloured chemosis," by this I mean that serum holding colouring matter in solution, but not fibrine, has been effused into the meshes of the membrane, which is of a brilliant scarlet colour, and about the eighth of an inch in thickness or elevation above the cornea, at whose margin it ceases in a projecting, well-defined border, leaving the cornea at the bottom of a circular

trench or well. In the meantime, the whole room is poisoned by the stench from the patient's mouth, from which protrude lumps of bleeding, gangrenous gum, as large as nuts, in all stages of decomposition. When he opens his mouth, you will see these sloughing masses, either so large as to bury the teeth altogether, or where pieces of gum have dropped off, they stand bare down to the sockets, and so loose that you may pull them out with your fingers. The roof of the mouth is also covered with warty, bleeding, ulcerated tumours, as is the mucous membrane of the cheek with apthæ, and the whole cheek is much thickened, and feels hard and brawny from effusion between the muscles, and under the mucous membrane. The thighs and legs are covered with ecchymosis, the hamstring muscles feel like hard ropes, and there is a lump in the ham as dense and as large as a cricket-ball. A tender node or two on the tibia, and œdematous ankles complete the picture. This will, I think, give you a tolerably faithful idea of a simple uncomplicated case of scurvy, such as were admitted in *thousands* into the Turkish hospitals; and, strange though it may seem, of all the varieties of the disease, this was by far the most easy to treat; such a case as this is almost certain to get well in a few days under proper treatment. And now let me lay down an axiom, which I shall endeavour afterwards to illustrate, viz., that the severity of the disease, as affecting the gums and skin, is no index to its fatality, in fact, they generally seem to be in an inverse ratio. I have come to this conclusion from the observation of many hundred cases. There is one notable exception to this rule, of which, however, cases but rarely occur, viz., exedent ulcers of the mouth and lips, which kill as lupus does, by exhausting the patient. These appear only when the type of scurvy is most severe, viz., about May and June.

They generally commence by a small ulcer on the mucous membrane of the cheek, which is painless, and often escapes notice till it has attained some size. It then appears as an excavated ulcer, about the size of a shilling, with sharp, everted edges, and ash-coloured surface. This increases rapidly in circumference and depth, and in three or four days it has perforated the whole thickness of the cheek.

Black sloughs continue to form and separate, the ulcer extends upwards, involving the ala of the nose and lip, and downwards, to the lower lip and angle of the jaw. The patient now presents a ghastly appearance, much like that of an aggravated case of lupus. But the lips no longer conceal the bleeding, mortified masses of gum, which protrude in every direction. A man may linger long in this horrible condition.

I will now proceed to describe what was in my experience the most fatal symptom of scurvy. Most authors on scurvy have mentioned obstinate constipation as one of the most troublesome and constant complications, and that the first step towards amendment was generally the supervention of a gentle diarrhœa. In the few cases I have seen in England this held good, but amongst the Turks, and in the English and French armies, the reverse almost always obtained, and diarrhœa was the most fatal and obstinate complication, and the one most difficult to remedy. Many cases were of course affected with ordinary diarrhœa and dysentery, to which all camps are liable in hot climates, but there was one kind of diarrhœa which seemed to belong to the scorbutic state alone, which never appeared but in undoubted cases of scurvy, and which was merely another form of the effusion of the elements of the blood. The dejections in these cases were copious, watery, generally of a pinkish hue, varying in

intensity, albuminous, and having altogether much the appearance of the rice water evacuation of cholera. They never contained bile, or any of the fibrinous matters, or slime seen in dysenteric evacuations, nor had they any fæcal odour, but every second or third motion contained a large dark coagulum of blood. These cases were unattended by pain or feverish symptoms of any kind, or by cramps or vomiting. The tongue was morbidly clean, the pulse weak, fluttering, and with a peculiar undulating thrill that I never felt in any other disease. The diarrhœa continues increasing in frequency till at last it seems to run continuously from the bowels. Muscular power is completely prostrated, yet the mental faculties remain clear to the last, and the voice, though weak, is distinct and shrill. There is great emaciation, and death takes place about the seventh or ninth day. I have never seen such a case as this with severe affection of the gums or skin. This peculiar diarrhœa occurred only in the months of May and June, when the type of scurvy was worst, and when epidemic diarrhœa and dysentery were also rife, but from these it was perfectly distinct, both in its symptoms and course, and in the notable fact that while these last were always more or less amenable to medical treatment, the diarrhœa of scurvy was but little influenced by any remedies.

Cases of sudden death from scurvy have been described by many writers, and in "Anson's Voyages," there is a most graphic description of such cases, which has been quoted by nearly all subsequent writers on the disease. A considerable number of cases of this description have fallen under my own observation, principally under the following circumstances. When a batch of patients have been admitted into the hospital during May and June, when the type of the disease is worst, all with few exceptions suffering from scurvy,

there have been generally two or three on whose prescription-cards the diagnosis has been written "slight scurvy," who at the time of visit have seemed in high spirits, busily engaged in arranging their beds, though too weak to stand or hardly to sit up. When asked how they are, they would reply, in a loud, ringing tone, that they were well, having nothing but weakness, no bad gums or legs, no diarrhœa. The tongue was clean and pale, the gums with a slightly red and swelled margin, the skin with a few scattered spots of purpura, the pulse full, but compressible and thrilling. But there was something unsatisfactory, even to a novice in these cases, about the patient's appearance, a wild, unsteady look about the eye, and a restlessness of manner, reminding one of a man who is going to have delirium tremens. When these peculiarities of voice, manner, and pulse were conjoined with excessive muscular debility and insignificant external symptoms of scurvy, the result was almost invariably as follows:—

The patient on seeing the surgeon approach his bed made a sudden effort to rise, gave a spasmodic gasp, and fell back dead, or dropped dead while being held up to evacuate his bowels, or while talking to his neighbours. Great prostration of muscular power is one of the constant and invariable effects of the scorbutic condition of blood; death in these cases is no doubt due to sudden failure of the heart's action from muscular debility, when it is quickly overburdened by a large influx of blood, occasioned by momentary excitement of any kind, particularly in the erect posture. Poupart, who examined the bodies of many scurvy cases during the epidemic in Paris in 1699, says: "All they who died suddenly without any visible cause of their death, had the auricles of their hearts as big as one's fist, and full of coagulated blood." The

oppression of breathing and sensation of constriction at the chest which scurvy patients complain of, is no doubt due to similar want of power in the diaphragm and other respiratory muscles. The brain and nervous system generally seem to be very little obnoxious to the effects of scurvy, even in fatal cases, (except those complicated with fever) head symptoms hardly ever occur.

It is a very remarkable fact in connection with this epidemic of scurvy in the Turkish army, and one which I have not seen noticed by writers on the subject, that, as a rule, those cases in which the disease shewed itself most evidently in the mouth and skin, were the cases most amenable to treatment; in fact, one might almost state that the injurious effects of the scorbutic state of blood on the system generally were in an inverse ratio to the severity with which those parts were attacked. That the converse also holds good is not at all improbable; in fact, though the analogy is not in all respects a correct one, these cases naturally call to one's mind well-known instances in eruptive fevers and other disorders, where the well-marked and timely appearance of the characteristic external feature of the disease is regarded as a favourable symptom. Such patients as I described to you in the earlier part of this lecture when speaking of the external features of scurvy, almost invariably got well if fresh vegetables and ascescent fruits formed part of their diet, anything more than these being to hasten their recovery, to alleviate local pains, and so forth. Furthermore, in these cases, general debility was never a prominent symptom, they rarely had faintings or losses of much blood from the bowels or bladder. They tottered about the wards on crutches, but that was from contracted tendons in the lower limbs and local weakness in those parts, their muscular system generally

being but little weakened. How common was it on the other hand to see men unable to sit upright without fainting, bloodless from hæmorrhage and diarrhœa, unable to feed themselves from sheer prostration of muscular power, yet with hardly a visible sign by which a person unaccustomed to such cases could distinguish them as scurvy, except the peculiar complexion, and just enough affection of the skin and gums "to swear by." The fatal examples of exedent ulcer of the cheek are but exceptions that prove the rule, everyone has seen cases in which the severity of the external symptoms of a disease, though in themselves the natural exit of the morbid poison, has been the immediate cause of death, apart from its influence on the organisation generally. Some cases of small pox and scarlatina anginosa are examples of this. Of course I do not mean to institute a strict analogy between scurvy and such diseases, but merely to draw a parallel illustrative of the manner in which one of the great laws of Nature holds good in the disease which we are considering, as in all others.

There is a striking and instructive contrast between the nature and effects of scurvy and those of inflammation. Both are morbid states of the blood differing widely in their origin and still more so in their course and effects on the tissues and the system generally. But there is a parallelism of contrast between them (if I may use such an expression) which is very remarkable. If inflammation be considered as an exalted, and at the same time, perverted condition of the attraction and mutual reaction which exist always between the blood in the capillaries, and the tissues that blood is to nourish, the symptoms of scurvy, on the other hand, may be defined as evidences of a depressed state of the same vital action. In the former, the blood in the affected part super-

sedes the healthy processes of secretion and nutrition by the formation of new products, morbid, it is true, but still, evidences of a high state of vitality in the circulating fluid. In the scorbutic state, on the other hand, the afflux of blood to an organ has only for its effect the giving up by the blood of certain or all of its constituents as they exist in the vessels. In a word, the two diseases may be placed highest and lowest respectively in the scale of vital energy. Though I should not like to affirm that the scorbutic state of blood was incompatible with the carrying on an inflammatory process, yet it is no doubt true that it is extremely rare to find the two co-existing in a recognisable form. Scurvy blood seems almost deficient in plastic power, and hardly able to support the processes of repair and organisation, which are carried on by a state of things analogous to inflammation. Cuts and scratches do not heal, blisters will not rise, nay, even the scars of old wounds and the callus of long before broken bones, unable to draw nourishment from so poor and depraved a source, again dissolve their continuity. Out of an experience of many hundred cases, I cannot call to mind one in which any active inflammatory process took place in a patient with scurvy. Passive congestion, as might be expected, is one of the leading symptoms, in fact it is the prelude to those extravasations which are the characteristic features of the disease.

The *treatment* of a case of simple scurvy in which the symptoms are external, is a very easy and straightforward matter, for if the patient be put upon a good, wholesome diet, of which fresh vegetables and vegetable acids form a part, and is kept from cold and wet, he is pretty sure to get well, always provided that no excesses even in antiscorbutic diet are permitted, which often bring on complications which

are more difficult to manage. But the judicious administration of the means of cure will often very much hasten the patient's recovery, and there are many auxiliaries to general treatment, which are very useful both for this end, and in rendering the patient less disagreeable to himself and others.

Thus, the diet of a scurvy patient admitted to one of the anglo-Turkish hospitals was always such as would not only be a total change from that under which the disease was contracted, but was also varied from day to day, and these particulars were found to be of considerable importance, both in eradicating the scorbutic taint from the blood, and in causing the absorption of effused matters.

For example, one day a patient would have boiled mutton, cabbage, and potato soup, milk and apples, or any other ascendent fruit that was convenient. The next day roast meat, sour-kroust, or salad, and eggs, with lemons or oranges. The ordinary drink was lemonade *ad libitum*, made with fresh lemons, sugar, and cream of tartar.

Ordinary looseness of the bowels, though carefully watched, was regarded as a favorable symptom, but the first appearance of watery stools was the signal for leaving off the vegetables, two or three lemons a-day being given instead till the symptoms ceased. Experience soon taught us how terribly intractable diarrhœa was in scurvy patients, in fact this was our grand bugbear that was continually guarded against. Preserved lemon-juice from the stores at Scutari was found always to produce diarrhœa, and after a few trials was given up. When the gums sloughed and bled much it was found that the daily free application of the solid nitrate of silver greatly hastened their return to a healthy state. So very successful was this found that no other application was ordinarily used, except

when the fœtor was very excessive, when washes of chloride of soda, alum, or tannin were used.

The hard brawny swellings about the legs mostly disappear under general treatment, but sometimes further means are requisite. After trying a variety of plans it was found that friction with soap-suds and warm water several times a-day, had more effect than any other means for reducing the swelling and restoring the suppleness of the part, especially in cases of contracted knee, and also in effusions under the periosteum. But in these and all similar cases, it was found that the iodide of potassium internally had a most marked effect in relieving pain, and in hastening the absorption of the effused matters. The treatment of the sloughing scorbutic ulcer, is a most difficult matter. Local treatment with the view of arresting the morbid action, seems of no avail after the sloughing process has once been established. I once or twice endeavoured to arrest the diseased action by the application of nitric acid, but only with the effect of aggravating the symptoms. All stimulating applications evidently did harm, the only plan seemed to be to get the patient as quickly as possible under the influence of anti-scorbutic diet, and to remove him from the crowded wards of a hospital to a pure air. In one or two cases only I have known the ulcerative process to stop, and the edges of the wound to granulate when a great part of the face has been destroyed. The internal administration of chlorate of potash, which is found so useful in gangrene of the mouth, in England, was several times tried, but with no benefit.

Cases of true scorbutic diarrhœa were terribly fatal. As in the case of the sloughing ulcer, if one could but get anti-scorbutics absorbed, the patient probably got over the attack, but so great was the irritability of the mucous membrane that

all food or medicine ran off directly by the bowels. No direct astringents seemed to be of any avail. Suppositories and enemata were equally useless. If any of these means succeeded for a time in checking the diarrhoea, any attempt at an anti-scorbutic diet was sure to bring back the symptoms. The only remedy which had any real effect was the trisnitrate of bismuth, with opium. The efficacy of this remedy in checking the diarrhoea of phthisis is well known.

We now come to the most important practical relation of scurvy as regards civilised nations. No European army could get into the state that the Turkish forces were during the late war, as the inevitable consequences of a neglected diet are well known to army surgeons. But still it is very difficult to maintain a large army in the field for any length of time (especially during the winter months), supplying it with an adequate amount of vegetable food. The consequence is, that although there may be no such plainly apparent cases of scurvy as I have described, yet, still, a large quantity of men on duty will be found to be slightly tainted. As long as their general health keeps good, this does not much interfere with their efficiency, but let such men become the subject of fever or dysentery, and what is the consequence? The effect of the complication of even a slight suspicion of the scorbutic diathesis is sufficient to render the type of these diseases doubly fatal and intractable. This was the case in the English and French armies, more especially the latter, and the consequence was a fatality from diseases of this class that was almost unparalleled, and, unhappily, the cause of this peculiar fatality remained for a considerable time unknown. Dr. Budd has suggested that some cases of scarlatina maligna, and severe epidemics of spotted fever may owe their peculiar fatality to the pre-existence of a

scorbutic taint in the blood. The petechial typhus, so fatal amongst the low Irish during the famine and the potato disease, was exactly similar to that by which so many thousands of our own troops, and those of our allies, were swept off in the hospitals of Scutari and Stamboul. I have no doubt in my own mind that what is called jail or camp fever, generally owes its peculiar malignity and characteristic symptoms to a scorbutic state of blood. Such epidemics never occur but when large bodies of men are ill-fed, and always at the end of winter and spring, when vegetables are most scarce. How necessary then is it that the diet of all patients admitted into military hospitals should be of an anti-scorbutic character, whatever may be the nature of their disease.

Under what circumstances do we see cases of scurvy in England? During the potato disease there were many cases amongst the lower orders, as that vegetable is the great anti-scorbutic of our national mode of feeding. The French, who make use of many vegetables that we throw away, are much less likely to suffer from any privation of this kind than we are. Amongst the utterly destitute of large towns, one occasionally meets with a case in some poor wretch, who for weeks or months has subsisted on bread and cheese. But the wealthy are not free from danger when they neglect dietary rules. A dyspeptic who has by doctors' orders confined himself for a considerable time to simple bread and meat, and farinaceous food, often, after a month or two of such regimen, begins to complain of weakness and swelling of the legs, wandering muscular pains, which he calls rheumatic, his complexion gets sallow, and his gums slightly swelled, and he notices a little spot of purpura here and there about his thighs, or a bruise mark over the tuber ischii. It

is not every one who recognises such a case as one of scurvy, but so it undoubtedly is, and the proof is, that the symptoms quickly vanish under two or three oranges or lemons a day.

Erasmus Wilson says, that he often meets with cases amongst delicate children of anxious mammas, who assure him that it cannot be anything the child has eaten that has brought out the spots on his legs, as he has had nothing but bread and milk, and meat, and Revalenta Arabica!

Dr. Garrod, some years ago, propounded a perfectly new view of the nature and treatment of scurvy. He says that potash alone is the element wanting in the blood, and that to supply this, is all that is required. His great argument is that potash exists plentifully in all anti-scorbutic remedies, that it exists in large quantity in the ash of muscle, that muscular debility is one of the first symptoms of scurvy, and that therefore this alkali is the one thing needful to cure the disease. But this argument seems to me to refute itself, for it is well known that the very worst forms of scurvy are seen in persons of whose diet flesh-meat or muscular fibre had formed no inconsiderable portion. The Turkish army in camp at Eupatoria had meat three times a-week; scurvy used to occur on board ship in olden times when fresh meat was plentiful. The natural instinct of a patient is a thing deserving of the greatest attention in such a disease as this, and anyone who has seen scurvy-patients devour lemons, or oranges, or grapes, or heard their continual cry for acids, vinegar, anything sour, will no longer doubt what it is the system is craving for. But if the alkali alone is not *all* that is wanting, so it is equally true that the acid alone is not sufficient to restore the blood to its healthy state. It is combined that they form the anti-scorbutic principle. The alkali is supplied from almost all foods except the farinaceous,

but the acid exists but in a certain class. But there are many articles of diet that contain both ready combined. The acid fruits and vegetables, stand, of course, first in the list, and next comes the potato. But I am not aware that the cabbage has received its due meed of praise as an anti-scorbutic. It was found in the Crimea that when neither fruits, nor potatoes, nor salad were to be had, that this homely vegetable acted very well, though of course more slowly, so that cabbage soup was always a regular dish in the hospitals. This fact is worth considering in the event of the potato disease re-appearing.



