It pays to be good. The first time I coined that phrase, if I did coin it—the first time I used that was on an occasion similar to this. I was called to give an address before the convicts of a State's prison and I was puzzled to know how I should start my talk to those men. I did not want to remind them of their past and I wanted to arrest their attention. Just as I was asked to go upon the platform it occurred to me to say that to them. So I said, "It pays to be good." Those men did not know what to say. They looked at one another. They did not know whether they ought to hiss at me or what they ought to say. Their jaws dropped. I added after two or three seconds "to yourself." You ought to have seen how their faces changed. Of course it pays to be good to yourself.

Well, now, this is an occasion somewhat similar to that one. I mean to imply, of course, that you are here because you are sinners. Every one of you has been guilty of something.
In those days our poor convicts had to wear stripes and I dare say most of you are wearing stripes somewhere. If we would look you over minutely we would find something to indicate the ways in which you have been treating yourself unkindly. The biggest thing, the most important thing you can learn while you are at the Sanitarium is how to be good to yourself. It pays. Everybody knows that. That is why we have this Question Box. It is to tell you what you want to know. I learn as much for this Question Box as you do, probably more.

QUESTION: When there is no free hydrochloric acid or pepsin in the stomach do you advise taking these?

ANSWER: It is all right to take the hydrochloric acid and perhaps it would not do any harm to take the pepsin, though it does not do very much good. Hydrochloric acid it is important to take. A person whose stomach does not make any hydrochloric acid should take it at every meal. It is something which the stomach ought to make and is no longer able to make. In such a case we do not have to call an animal to get it. When the thyroid gland ceases to function properly we have to swallow a fraction of the thyroid gland of another animal in order to get the
thyroxin which the thyroid gland makes. So if a person is suffering from diabetes, that is, because his pancreas has become incapable of making the insulin which is needed to enable him to utilize sugar, he has to take a little fraction of the pancreas of another animal, and now it has been found out that when a person is suffering from pernicious anemia it is because his liver has gone out of business, at least it has retired from certain lines of business, and he has to take a little fragment of the liver of another animal in order to supply the body with something which is needed to enable it to make blood cells. Some people are doing the foolish thing of eating liver. I do not know a more unwise thing a person could do than to eat liver. One of the men who first proposed the use of liver, who first made the discovery that by the use of liver pernicious anemia might be cured, at least temporarily—only while you are eating the liver, however—told a friend of mine less than a month ago that every one of these persons who is eating liver is going to die of Bright's disease of the kidneys. I am telling you that publicly, which is the first time it has ever been mentioned in public. If you have a friend who is eating liver tell him that Dr. Minot said that every one of these people who is eating
liver is going to die of Bright's disease. How do I know that? Because Dr. Newburgh, of the University of Michigan, fed laboratory rats on liver and in ten days they all had Bright's disease. Seventy per cent. of their diet was liver. They lived mostly on liver. If they only took a little liver it was a longer time, but every one inside of a few weeks, every single one had nephritis, so, as Dr. Minot said, I know every one of these patients will die of Bright's disease.

Well, now, you do not have to eat liver. Fortunately you do not have to eat liver. It has been found that you can make an extract from the liver which excludes all the poisonous part of it. It is possible to make an extract from liver which will remove all of the poisonous elements. It is the protein of liver which is so poisonous. This can be removed. So an extract is being prepared and is used. We are using it here in this institution, so nobody needs to eat filthy liver. Liver is the filthiest thing you can possibly come in contact with. Nothing I know of is so filthy as liver. The excreta of animals does not compare with liver in its filthiness. I have had examined a good many times the fresh droppings of animals and I never have found one that contained so many manure germs as liver itself does. That is a fact. You say "That is very strange." No, it is not strange
because while the protein of the liver is deadly to human beings as well as animals it is just the thing germs like. They are so fond of it they thrive on it.

All animals become infected in the process of slaughtering. It is a good thing for people to think about. What I am telling you now I wish you would tell your butcher. I am going to read to you something from the packers’ Blue Book and you will see what the packers tell their people to do. I will send for this book. This book of course is not publicly circulated. I happen to have a copy. I do not see any objection to making it public.

Suppose a man or an animal is going to have a surgical operation. When a doctor nowadays is going to operate upon a dog or other animal he takes the same care he would if he was going to operate upon a human being. The animal is thoroughly washed and scrubbed and the surface is shaved clean and washed clean and tincture of iodine is painted on to make it thoroughly sterile before the incision is made. Why? Because the skin is the only thing that protects us against the attacks of germs. The flesh of an animal is the thing in which germs flourish more readily than anything else.
Suppose you have been away from home a couple of weeks and you get back home and you find an awfully bad odor about the house. You go hunting around and have some suspicion of what it is. By and by you find a closet from which this awful odor emanates and down in the corner is a dead rat. Why does this dead rat have such a strong odor? Because it has these germs in its intestine. The moment it dies the germs begin to spread all through the body and in a very short time the animal's body is just alive with germs which produce indol, skatol and pyrrol and several other poisonous products, volatile aromatic products.

When an animal is going to be butchered they do not take all these pains. They do not wash it and scrub it and disinfect it. The animal is just hauled from the yard where it has been lying about in its own filth, which has dried on its body, knocked on the head, its throat cut and its skin removed. The butcher's hands get dirty when the animal is rolled over the killing floor and the raw, warm flesh is in contact with the filthy floor and the result is although the flesh is washed they do not wash the germs off because they immediately grow in. It is exactly the same thing as though you put a spoonful of sour milk in a panful of fresh, sweet
milk. It would not be but a few hours before it would be spread all through the milk and the whole pan of milk would be sour.

It is exactly so with the carcass of the animal. When the germs come in contact with the raw flesh why then these germs spread all through it.

When I was in Paris a couple of years ago I went to the Pasteur Institute. I always go there for I was acquainted with the famous Professor Pasteur and visited the laboratory when he was living. I knew him and I have been well acquainted since that time for many years with his successors, Metchnikoff, Tissier, Besredka and numerous others of these men. I watch their work very closely because they are making important researches and I have been able to make great use of their work in our work here at the Sanitarium.

I was talking with the professor there, Professor Tissier, about these intestinal germs and I found him a great enthusiast. He was the man who discovered how to change the flora. Metchnikoff propagated and published the idea, but it was Tissier who was his assistant at that time who made the discovery and he believed in changing the flora one hundred per cent. It was not often accomplished, but he believed the change ought to be at least
98 per cent. Some of you think it is hard if your doctors require you to get the flora changed to 75-25.

Dr. Tissier showed me a rabbit that had been killed in the woods and this rabbit was wrapped in a piece of wire netting. This rabbit was wrapped in wire netting, nothing more. He had that rabbit in his laboratory for a whole year and there was not the least bit of offensive odor about it. The animal had been killed in a forest far away from human habitations, far away from human beings where it had no contact with these polluting bacteria. It was killed and simply wrapped up in the wire netting. It had been kept in a warm laboratory for a year and there was not the slightest taint about it. It was dried up, thoroughly dry, and there were no bad germs in it, you see.

Now, an animal killed in a slaughterhouse is exposed to contact with bacteria so that within a week’s time or even less than that, within two or three days’ time, within 48 hours if it is not put into a refrigerator a very cold place, its whole body is swarming with these putrefactive bacteria. That is Nature’s method of carrying out the Creator’s fiat, "Dust though art and unto dust shalt thou return." It is the germ that
carries it out. It seizes the body of the animal and reduces it back to
dust from which it came. This process goes on more or less rapidly accord-
ing to the temperature. But all animals as they are killed become infected
and so before they are eaten they are swarming with these manure germs,
these germs that come from the surface of their own bodies.

I must say a word further upon this point, however, that we need
hydrochloric acid in the stomach first of all to disinfect the food. All
the food we eat is more or less infected, but the hydrochloric acid pro-
duced by the stomach disinfects the food. That is very important. Right
here at the very portal of the body the food is disinfected so in all the
rest of the 30 feet of the intestine the bacteria will be less numerous
than they otherwise would be. An animal living under perfect conditions
would have no germs at all in its interior. Small animals that are fed
upon a germ-free diet escape bacteria and escape putrefaction entirely.

In the Pasteur Institute some experiments were made with various
animals. For instance they had some bats there from South America, some
fruit-eating bats, and these fruit-eating bats lived on bananas and there
were no germs in the excreta of these animals at all. The excreta was en-
tirely free from bacteria. It simply had a faint odor of bananas, nothing
more. There were no germs there at all. There is no reason, not any normal
reason why the clean wholesome food that we swallow, why the residues that
escape from our bodies should be any less clean than the food we eat. There
is no normal reason why these residues should not be just as clean and just
as free from odor and from offensive properties as when it was eaten.

Why are the food residues, the bowel discharges, so horribly offensive?
Simply because the residues are allowed to lie about and undergo putrefaction.
But they must be infected by bacteria, so the more unclean the food we eat
the more bacteria we will have in our interiors, the more active will be
this putrefactive process.

Now, hydrochloric acid in the stomach destroys the germs that we
swallow. Even such a thing as liver may be disinfected. Even the germs
of decomposing food may be destroyed. When a dog is fed putrid meat, for
example, and if an hour later the dog is killed and the contents of the
stomach examined they will be found to be entirely free from odor. The
acid of the gastric juice has disinfected it.

So every person who has lost his hydrochloric acid should take
hydrochloric acid, and fortunately the hydrochloric acid you get from the
drug store is just as good as the hydrochloric acid the stomach makes.

It used to be difficult to take it because it had to be taken in water, diluted in water, but we have found at last a way of putting this into tablets, so if a person has to take hydrochloric acid he can take these little tablets without any inconvenience.

Some one has borrowed the book, but I will tell you briefly what the books says. It describes what to do with the offal of animals, what to do with all the different parts. Every fragment of the animal is used in some way. Mr. Armour says "Nothing escapes but the squeal." The horns and hoofs make excellent calf's foot jelly, etc. and the alimentary canal, the intestine, is mostly used for filling with fragments of things that are not fit to offer by themselves, ground up and the casings are filled full of this stuff. There are different kinds of casings. There are export weasands. These export weasands must be very clean. They must not have any warts nor green warts nor knots and they must be free from manure and must not smell bad and must be very carefully packed, etc. Now, there are others that have manure stains and have knots and knobs and warts which are masses of tubercles. That is what
those warts and knots are and they do not smell good. These should be
put by themselves and marked "domestic weasands." These domestic weasands,
you cannot pack these in United States inspected places, and so they will
have to be sent to places where there are no inspectors. That is what the
packers' encyclopedia says. These things are to be marked "domestic
rounds," "domestic bones," "domestic weasands" and sent to places where
there are no inspectors. The people are deliberately told how to dodge
the law, how to impose upon the people and how to get the American people
to put down in their stomachs things that belong in a Potter's field or
a rendering establishment.

I asked a man from Chicago some years ago what his business was.
I did not mean to be inquisitive but I wanted to know if there was any
relation between his business and his state of health. I wanted to know
if he lived a sedentary life or an active out-of-door life, whether he
had a business that worried him or not, etc. So when I asked him his business
he hesitated a little. He said, "Doctor, I don't really like to tell you
what my business is." He said, "I suppose I ought to. I will tell you
confidentially. This is my business: I am stationed at the packing house and you know there they inspect the animals. They sort out the animals before they are killed. Those that are supposed to be sound they send them to the slaughterhouse to be killed. For instance the hogs have to walk up an incline plane and if the hog is able to get to the top he is a sound hog, but if he falls down before he gets to the top he is a sick hog and he is sent over to me. It is my business to collect these sick animals in a certain place and at night I drive them over to a certain place where there is a special slaughterhouse and they are killed and the next morning are sent down to the downtown meat shops to be sold along with other meats."

He said, "That is my business." He said, "Of course these animals ought not to be killed, but there is a good deal of money involved, and so I have been in that business for a good many years."

Mr. Armour's methods were perhaps not quite as thoroughgoing in their economic development as some of the methods over in London. I was reading not so long ago in a sanitary work that told of the different ways of utilizing dead horses, how the hoofs were used for glue, the hides used for leather, the bones and flesh used for fertilizer and the livers they had recently
discovered were roasted and made into coffee.

QUESTION: Does hypothyroidism ever affect the mind?

ANSWER: Yes, there is no doubt of it. A person who has hypothyroidism is likely to be a little dull. I remember a gentleman who some years ago brought his wife here. He brought her into the office and said, "Now, Doctor, I frankly tell you that I have brought my wife here just to please her because she would not give me any peace. I had to bring her here because she insisted on coming. I know it is no use for all the doctors at home, and they are as good as any you have here, I am sure, have been trying to do something for her and could not find out what is the matter with her. Nobody can." I looked at her and said, "I think I know what is the matter with your wife now."

"That is ridiculous; nobody knows; nobody can find out; it is a hopeless case."

This lady was pale and she had an anemic look, her movements were clumsy, her voice was thick and her tongue was thick and the poor woman evidently was not clear headed. Her speech was very slow."

I said to him, "The proof will be in leaving your wife here a couple of weeks and when you come back you will find she is a new woman."
It was most delightful to see that man's surprise when he came here and found his wife as young, spritely and handsome as she ever was. Her thyroid gland had ceased to function. All in the world we did was to give her some dried thyroid and all these symptoms disappeared so fast you could see improvement from day to day.

It is remarkable the effect of the thyroid upon mind and body. The thyroid gland and pituitary gland and adrenals control all the functions of the body to a remarkable extent, not only the organic functions but the psychic functions as well. For instance, when a man gets angry or worried his adrenals are set to work and they pour out adrenal secretion in a prodigious way and the result is within a few seconds this man's blood is just flooded with this secretion. This secretion seems to be necessary in a state of terror because the adrenal secretion stimulates the muscles to a wonderful degree so that a man who is frightened can run faster and can jump farther and strike harder and fight better when he has this adrenal secretion spread out in his body. That is Nature's method of preparing a man for a conflict. If a man is worried the very same thing happens. If this continues any length
of time it produces very bad effects. It is an unbalanced condition. You can see what an effect it would have upon a man if he was in a rage all the time. You know how the hand trembles when a person is thoroughly angry. It is because his muscles are so tense he cannot hold them still. So you see these secretions have a marvelous effect upon the body.

Here is a mother, for example, nursing her child. She becomes very angry and the child has a convulsion. Why? Because this poison has got into the milk secretion. The poison was first in her blood and poisoned her and then it is passed on and poisoned the baby.

QUESTION: What causes lumps in the jaw, in the neck and near the tonsils?

ANSWER: This may be due to simple infection. In young persons it is more often due to tuberculosis. It always means infection of some sort.

QUESTION: What is the cause of twitching and jumping of the skin in different parts sometimes lasting off and on for days?

ANSWER: It is not the skin that jumps, it is the muscles underneath the skin. It is muscular irritability. It may be due to many causes.
It may be a reflex irritability. It may be too much adrenalin.

QUESTION: Are beefsteaks harmful to one in good condition and eaten say three times a week? If they are kindly explain in what way they are harmful.

ANSWER: Mr. S. S. McClure, founder of McClure's Magazine, came here a good many years ago. He was a great meat eater. We found him in a very miserable state of health and he remained here two or three weeks and became a reconstructed man and was wonderfully improved. If he had only come about six months earlier he would not have lost his magazine. Unfortunately he was broken down in health and before he was able to recover his health again it had got into such a complicated situation he lost it.

Mr. McClure became a rigid vegetarian. He became thoroughly convinced of the correctness of the biologic way. That means simply to live according to biology, to eat what you ought to eat. He went back to New York and he was eating one day at the Waldorf Astoria with some friends and they began to make a little sport of him. He stood for it a little while and then turned upon them and said, "Gentlemen, I never eat anything
that rots." He did not say another word. He was able then to eat his meal in peace.

The biggest objection to beefsteak is the fact that it rots. If you leave it outside it rots and if you swallow it rots. If you leave it in a warm place it is certain to undergo putrefaction. When you eat meat about one-seventh of what you eat, according to the best authorities, undergoes putrefaction and the products of putrefaction are absorbed into the body. That is the great objection to eating meat.

QUESTION: What is meant by complete exhaustion and what is the cure?

ANSWER: I do not know if I can explain very well what exhaustion is unless you have had an experience of it. If you have ever got completely tired out you know what it means to be exhausted. We have a certain fund of energy. The nerve centers are storage batteries.

You are out in your automobile some time and you finally come to a stop. You cannot go on and you begin to inquire into the matter and find you have plenty of oil and plenty of gas and everything is all right. The machine is all there but it will not go and you finally discover that you have a short circuit that has run down your battery and you have got to
have it recharged. The battery is exhausted and you take it to the man
that makes repairs. He will tell you that your battery is exhausted.

The same thing is true of the body. The nerve centers are really
storage batteries. Suppose that represents a nerve cell (illustrating).
You look at this nerve cell when it is a rested cell and it is full of
little gray particles. This has been actually seen with the microscope.
It is an actual scientific fact. Now, if that cell belongs to an animal
that is made to exhaust itself—for instance, one observation was made upon
a carrier pigeon. A carrier pigeon was examined before it went on a flight
and that is the state in which it nerve cells were found, and after a long
flight in which the bird was completely exhausted these cells were found in
this condition (illustrating) shriveled and shrunken up and with only a very
few of these gray points which are known as energy granules. The energy
granules were gone. Every one of these energy granules represents a certain
amount of energy and the cell itself is a storage battery and sleep is the
time during which the battery is recharged. While we are awake and at work
we are using up energy; when we go to sleep our nerve centers are recharged.

This gives me an opportunity to call attention to a very pernicious
thing that interferes with the recharging of these batteries. When a person
begins to feel tired it is because his battery is running down. What he ought to do when he feels tired— he ought to do just what he does with his automobile battery. He ought to have it recharged. He ought to lie down and rest and let his battery become recharged.

But he can get along without doing it. He can for a little while dodge this duty. He can go to a tea room or restaurant somewhere or a cafeteria and order a cup of coffee or a cup of tea and that cup of coffee or tea, after he takes it he will not feel tired any more. That does not mean his battery is recharged but simply he does not know he is tired. When a person is tired it is a signal that his battery is run down and needs to be recharged. It is nature ringing the bell to call attention to the fact that your battery needs recharging. If you go right on working you will over-discharge your battery. Over discharging a battery always does it harm. It takes a long recharge to bring it back when it is over-discharged. You can over-charge a battery without doing it any harm. You can sleep a little extra without doing your battery any harm.

Perhaps instead of getting a cup of coffee or tea you drop in at a drug store and order a glass of Coca-Cola. That is something that rests
you in five minutes according to the advertisements, which is a prodigious lie. It does not rest you at all. It makes you think you are rested when you are not rested.

There is another thing that the caffeine of coffee does. It prevents the proper recharging of the battery when you sleep, because it interferes with sleep. It may perhaps prevent you from sleeping at all so you cannot recharge your battery at all. If you go to sleep you do not sleep as soundly as you ought and the recharging process does not go on as it ought and that is the reason why the coffee drinker gets up so often with a coffee headache.

How many of you have heard about a coffee headache that was relieved after taking a cup of coffee? Hands up. You all know it, I see. You look guilty in your faces. You have tried it and everybody knows about it.

What does the coffee do to you? You wake up in the morning and you feel so wretched, so miserable and you take a cup of coffee and you feel all right. What has it done to you? It makes you think you have had a good night's sleep when you have not had it. Your fatigue center is put to sleep. So you go right on working, using up your energy and doing yourself harm. That is
not being good to yourself at all; that is abusing yourself. When you
sleep your battery is not properly recharged and you wake up in the morning
feeling miserable and you take a cup of coffee and you feel all right, but
you are not all right. You go on until the effect of the coffee is gone
and then you are miserable again and you must drink another cup of coffee.
I know people who drink 10 or 11 or 12 cups of coffee in a day.

I remember some years ago we had a doctor here from Louisiana.
The people among whom he practiced were mostly old French Creoles and
they have a custom there whenever the doctor comes they must always offer
him a cup of steaming coffee. He had a very large practice and he had to
drink a cup of coffee at every place he called. That meant 40 or 50 cups
of coffee a day, and he discovered after a while that when he had a day off
and did not travel that he missed something, so he had to carry caffein pills
in his pocket. He was taking 52 grains of caffein every day. That is the
equivalent of 26 cups of restaurant coffee. Every cup of coffee contains
from two to four grains of caffein and every single cup, every spoonful does
harm.
QUESTION: To what extent can bananas be eaten without harm?

ANSWER: You can live on bananas if you want to. Bananas are perfectly harmless. The trouble is people eat bananas without chewing them. The banana is a peculiar kind of fruit. There is nothing in it that the stomach can digest. The stomach cannot digest bananas. The digestion of bananas takes place below the stomach. Nature has in the ripe banana done everything that the stomach is able to do for the sunshine digests food as well as the stomach. So when you take banana into the stomach in chunks those chunks will remain there for a long, long time. It cannot digest in the stomach. So the secret of eating bananas is to see that it is reduced to a puree. You can do this by taking care in eating bananas to see that every particle is reduced to a liquid state and then you can eat it without any trouble. Cut the banana in little chunks and put them in a tumbler and then with a fork chop it up quite freely and then stir it and inside of one minute you will be able to stir it like white of egg. You will be astonished. It becomes liquid so you can turn it from one glass to another. Then if you want to have a nice banana cocktail add a little fruit juice and a little cream and you have a very delicious thing and absolutely digestible.
QUESTION: Can intestinal dyspepsia be cured? If so, what is the treatment?

ANSWER: Intestinal dyspepsia generally means a bad colon. It means colitis. All you have to do is to regulate the diet in such a way as to keep the colon active and the intestinal dyspepsia will cure itself.

QUESTION: What causes free hydrochloric acid to disappear from the stomach?

ANSWER: The stomach glands are worn out and have retired from business.

QUESTION: How many forms of colitis are there?

ANSWER: There are just as many forms of colitis as there are different kinds of germs that make colitis. There are perhaps a dozen different kinds of germs that grow in the colon and they are all capable of producing colitis. It is simply an infection and the cure is to keep the colon clean and to change the intestinal flora by the simple means which we employ here which everybody knows—keeping the colon free from putrefactive food residues, taking Lacto-Dextrin in sufficient quantity to feed the friendly germs and keeping the colon empty by means of the
enema and the use of psyllium seed and bran and Paramels, which are the best form of lubricant.

QUESTION: What does a heavy brown coat on the tongue indicate?

ANSWER: It indicates that your colon is loaded with putrefying material.

QUESTION: What is the cause of blackheads on the face?

ANSWER: Simply that the little glands or ducts which carry off the oily secretion from the oil glands have become hardened and those ducts have become filled with hardened sebaceous matter, and the blackhead, that worm that you squeeze out, is simply dirt that is on the outside end on the little column of fat. If you take one of those little specks of fat that looks like a worm and put it on a glass and put a little warm oil on it and put it under a microscope and you will see it is all alive. There are a lot of little bugs there, one of which is known as demodex folliculorum. It is a relative of the itch mite. It is an eight legged creature. There is a grandfather demodex, a grandmother demodex, a father demodex, a mother demodex and a lot of little demodexes. They crawl out on the skin at night and wander out on the surface and then they
crawl back before daylight and they do not take pains to make their feet clean and they carry germs down in these little pockets. These germs grow and develop and that is one thing that makes pimples.

The remedy is to bathe the face with hot water, to wash it thoroughly and raise your resistance.

QUESTION: What is the cause of a prickling feeling all over the body.

ANSWER: It is a parathesia due to an irritated state of the nerves or nerve centers. It can be relieved. One of the most certain remedies I know of is getting the skin well tanned.

QUESTION: Does the colon have anything to do with pyorrhea?

ANSWER: The absorption of poisons from the colon leads to lowered resistance and that leads to decay of the teeth and infection of the gums.

QUESTION: How can one conquer depression?

ANSWER: That is a trouble sometimes, how to get rid of the disposition to worry, a blue feeling. It is not always easy to throw off all these causes of depression. Sometimes the cause is inside and sometimes it is outside. In the first place be sure to get rid of all the outside causes.
Everything that you can yourself eliminate, all outside worries, be sure to do that, then the inside worries, the worst ones I know anything about are those that produce a general toxic condition of the body for these colon poisons are very depressing poisons. I do not see how anybody could be happy with a bad breath and coated tongue. This can usually be overcome by keeping the colon clean, changing the diet, changing the intestinal flora, and using such mechanical means as the enema to keep the colon clean. Then one must make a mental effort to help himself in the direction of cheerfulness and that can be done by cultivating optimism and good cheer and the best way to do that is to get hold of somebody that is also depressed and do your best to cheer him up. Just make it your business to cheer up someone. Every morning start out to find somebody that is unhappy and cheer him up and in the effort to cheer up your brother you will cheer yourself up.
Question Box Lecture in the Sanitarium Parlor, July 30, 1928

By

JOHN HARVEY KELLOGG, M.D.

QUESTION: What hope can you hold out for recovery for a man between fifty and sixty years old who is suffering from nervous exhaustion to the extent that his mind and will power are greatly impaired?

ANSWER: Well, of course it will depend upon the extent to which they are impaired. There is great hope. If he is suffering from nervous exhaustion there is a cause. Now, if we can remove the cause—and we generally will find in most cases that the real cause of this nervous exhaustion is poison and it is not exhausted nerves at all. It is poisoned nerves. If we find a man with a bad breath, coated tongue and sallow skin we know that man is saturated with poison and when these poisons are eliminated the man begins to come right up. He is intoxicated just as much as a man that has been swallowing quantities of liquor or opium.

I told a lady a while ago—as I approached hershe had an
awfully bad breath. I said, "Madam, I see that you are suffering from autointoxication."

She was very angry. She shook her fist at me and said,

"You are entirely mistaken, Sir. You are entirely mistaken. I have not had a drop since night before last. I admit I do take a toddy at night to make me sleep, but I was here last night and could not get any." She got plenty of it down in Toledo.

**QUESTION:** Is carbonated water injurious to the stomach?

**ANSWER:** No, it is very wholesome. It is a mild stimulant to the stomach.

**QUESTION:** Why do some skins freckle instead of tan?

**ANSWER:** Because of the unequal distribution of pigment cells. The tanning of the skin is due to the production of pigment in the skin, and in some people this pigment is distributed irregularly in spots instead of being universally distributed and that is the cause of freckles.

**QUESTION:** If a person has chronic constipation is it advisable to take mineral oil, Lacto-Dextrin, agar, bran and Psylla?
ANSWER: Certainly. These are necessary helps.

You might as well ask me the question, "If a man loses one of his legs is it necessary for him to wear a wooden leg all the time?" It is the same kind of proposition exactly. These old lazy colons as they are called are crippled. They are not lazy, they are crippled, and they have to be helped. A man who suffers from chronic constipation has to take two or three times as much bran as is necessary for a normal man who has never had constipation because his colon is crippled.

Let me give you something of an idea of what happens to the colon when it is badly abused. Suppose this is a normal colon. Here is the stomach up here, here is the small intestine and here is the ileocecal valve. The food residues are deposited here in the colon in about eight hours after the food is eaten. The food is all digested and the useful part absorbed and the residues get into the colon in about eight hours from the time the food is eaten. Here it is here. Now in three or four hours more it ought
to be dismissed from the body. Say the breakfast is eaten at eight o'clock in the morning, then dinner and supper, and before ten o'clock, before one goes to bed at night, these residues should be dismissed from the body.

But that is not the way it operates with the average man whose bowels move once a day. This is the order: breakfast, dinner and supper to-day, breakfast, dinner and supper to-morrow, breakfast and dinner the next day, and so day after tomorrow after dinner the evacuation of the residues takes place. So people whose bowels move but once a day retain these residues 53 or 54 hours, whereas the residues ought to be dismissed in one-fourth that time. You see the result is when these residues are retained instead of having only the residues of two meals to take care of in the colon here there are the residues of seven meals, and the colon becomes enormously distended, and the cecum becomes overdistended and sometimes a pouch will form like that and this valve will be broken down so you have that kind of colon and the result is these residues accumulate down here and sometimes will not be emptied in two or three weeks. The
residues lie here undergoing putrefaction. I have operated upon cases
in which there was a pouch here that would hold two quarts.

I remember a case, a lady who came to me last year, I think
it was, and she was so distressed and so despondent and so irritated she
talked almost incoherently. I found she had a very bad breath. I told
her what to do. I gave her a couple of red capsules. I said, "You take
these to-morrow morning and to-morrow night before you go to bed you
take enemas until you wash this red color out. In four days she came
back a new woman. She was so changed that I did not know her at all.
She said, "I see you do not know me. I am the lady you gave those red
I took the enemas as you told me until the red color disappeared and it
took nine enemas to wash out that red color, and the last one brought
away a large quantity of black and offensive material and I have been
a new woman ever since."

That is not an uncommon experience. We have had that very
thing happen a hundred times. I had some more striking cases than
this one I just mentioned to you. I remember one case in which a lady
actually lost her mind. I thought the poor woman would have to go to
an insane asylum. I actually sent for her husband to take her away because I thought she would have to go to an insane asylum and be there a long time. Within a couple of weeks after her husband arrived—

I had ordered enemas for her but they had not been given thoroughly enough. The nurse had given the enemas with much more than usual thoroughness, but it seems it was not thorough enough for this particular case. The nurse succeeded in getting her colon completely cleared out and she recovered her mind the next day and made a perfectly good recovery and is alive to-day. That is more than 20 years ago. She would have been in an insane asylum within a week if it had not been for the treatment she received.

I am going to tell you a little more about that because it is such an important thing. I had a visit six or seven years ago—I will tell you the whole story. A professor in an Eastern college came to me and said to me, "Doctor, a relative of mine has lost her mind and I have taken her to an institution for the insane for treatment and the doctor there thinks she needs an operation." He wrote me first.

"I want to bring that doctor out to Battle Creek and I want to have a
consultation with you about this case to see if you think this operation is necessary."

Well, the Doctor came and the Professor came and we talked the case over and the Doctor said he thought an operation was needed. I said, "I doubt it. I think that this case is one in which the patient is suffering from poisoning from the colon and by reforming the colon the patient can be relieved." The patient was operated and died.

The fact is this doctor had discovered there was a connection between the colon and the brain. He found it was so direct that he thought it was necessary to remove the colon, and he made it a matter of routine to remove the colon in a large number of cases and so many of his patients made rapid recoveries after the colon was removed that he felt justified in going on although the mortality was 25 or 30 per cent. The mortality was so great the friends of the patients made a disturbance about it and finally a committee was appointed by the Legislature to investigate and the Doctor had a rather drastic investigation. I at one time saw a room in which the whole four walls
of the room were covered with photographs of colons that had been removed under this Doctor's direction. He had a surgeon come over to his place every single week, sometimes twice a week, to remove colons. He removed hundreds of colons. I had a letter from him in which he said it was the routine practice to remove the colon in certain types of insanity. I labored with the Doctor to try to reform the colon. After he had this experience, the drastic investigation by the legislative committee, it pretty nearly upset his own brain. He had such an unpleasant time of it he had to take a rest of several months himself to recover his equilibrium. A few months later I had a letter from him. He said, "Doctor, I have been trying your plan of washing out the colon instead of removing it and two and a half times as many of my patients are getting well as used to get well by the old method and I want you to send us a dietitian. We are thinking about adopting your dietary."

So I sent him a dietitian and pretty soon I got a letter from him that the board of directors of the institution wanted me to go down there to install our methods of treatment. I went down there. As I
was passing down the hall I met a lunatic. He was said to be a lunatic, but he was a cultivated gentleman, and he got hold of my hand, shook it most vigorously and said, "Doctor, I am taking your treatment and am getting well." I found the man was almost well. Pretty soon he went home.

They installed departments for colon treatments the same as we have here and they are going at it in a very vigorous manner. I had a letter from the dietitian just the other day. She said, "We have five hundred patients on the Battle Creek diet and the Battle Creek treatment and the results are simply wonderful."

I mention this to you so that you will see what I am saying to you is a real thing. This thing has been so thoroughly demonstrated at the present time that institutions are taking it up. I could tell you of several insane asylums that have adopted this method of treatment and have adopted our diet and cut out meat. One of the institutions in this state has two large buildings in which there has been no meat served for a year and a half and no pepper and tea and coffee. They put the patients on a simple natural dietary and are giving this natural rational treatment and the patients are getting well.
It is my opinion that the insane asylums of this country contain some thousands of people who are there simply because their colons are neglected. Go into the ordinary state institution and you will find that the patients' colons are in an awful shape. I was at the meeting of one of these institutions some years ago in which a doctor reported a considerable number of cases in which the patient's bowels moved once in three weeks and once in two weeks. He had a list of them which he put on the screen. There was the report, so many patients' bowels moved once in three weeks, once in two weeks, once a week, etc.

Certain methods of treatment had been prescribed and there had been a little improvement. Patients whose bowels moved once in three weeks now improved to such a degree the bowels moved once a week. Some improvement had been made, but it was very slow.

This thing is a matter of tremendous importance. It is hard to impress people with its real significance. I find there is a great prejudice even among doctors. The idea seems to be thoroughly rooted and grounded. In the first place if the bowels are regular that is all that is necessary.
I asked a lady about her bowels. She said, "Doctor, they are perfectly regular, remarkably so."

"Well," I said, "how often do they move?"

"Twice a week, Doctor. Every Sunday and every Wednesday."

Dr. Lauder Brunton told of the case of a lady whose bowels were regular. He let the case pass along, but finally he went back and asked the question over again about her bowels. He said, "Your bowels are perfectly regular. How often do your bowels move?"

She replied, "Once in three weeks."

Dr. Austin Flint, of New York, used to tell of a patient whose bowels moved regularly every six weeks and every six months, six weeks and six months.

QUESTION: Last Monday evening I understood you to state if a man had pernicious anemia and ate liver it would cure him but he would be liable to die of diabetes. Is that correct?

ANSWER: No. There is a misunderstanding. An eminent physician who has had more experience perhaps in treating cases of pernicious anemia by feeding liver than anybody else said to a friend
of mine, "Of course, I know that every one of these patients who
is eating liver will die of Bright's disease. The liver cures him
of pernicious anemia but it will kill him of Bright's disease, for
liver is one of the most pernicious of all forms of animal food.
The protein of liver is poisonous. Dr. Newburgh, of the University
of Michigan, found by experiments upon rats that rats get nephritis,
or inflammation of the kidney, within ten days after being fed on
liver. If their diet consists of 70 per cent. of liver the rats will
get nephritis in ten or twelve days and pretty soon they die.

QUESTION: Is infection with the amoebas serious and is
one who has had it likely to have it again?

ANSWER: There are certain kinds of amoeba that are parasi-
tes. Some of them are perfectly harmless, but there are parasitic
amoeba that produce toxic substances that do the body great harm.
These can be destroyed by proper treatment. The most important thing
is to change the intestinal flora, and if the intestinal flora is
kept changed so that there is no accumulation of food residues in
the colon the amoeba does very little harm because its normal function

is that of a scavenger and if it has not any scavengering to do it does not flourish.

**QUESTION:** Are the nerves controlled entirely by the brain?

**ANSWER:** The brain is the great nerve battery. All the nerves of the body are connected with the brain either directly or indirectly. They are not under immediate control of the cerebrum or of the cranial brain. Some of these nerves are under the control of the abdominal brain, the solar plexus and the lumbar ganglia.

**QUESTION:** Is it injurious to swallow the wax when eating honey?

**ANSWER:** No; swallowing a little wax does not do any harm.

**QUESTION:** What can be done for self-consciousness?

**ANSWER:** The best remedy I know of for thinking too much about yourself is to think of somebody else. A case comes to me just now of a lady troubled in that way. Her husband died of tuberculosis and she thought it was her duty to mourn for her husband as a loyal wife ought to do, so she visited the cemetery every day and sat down for hours by her husband's grave. She mourned for hours every day and
pretty soon she began to pine away and was dying of the same trouble
her husband had and on the same side. Her husband had tuberculosis
of the left lung and she had tuberculosis of the same lung and she was
going to die exactly as he did. She was pining away. She came to see
me one day and I examined her lungs and found there was nothing the
matter with her lungs. Her lungs were all right. She was simply self-
conscious. She was thinking about herself, centering her mind upon
herself. There was a liability that she would become diseased if she
kept on that road. I said to her, "I think you have a wonderful con-
stitution and it is going to take you a long time to die; you are so
very hardy I would not wonder if some of your friends would die off
before you did. If I were you I would not do it."

She said, "What should I do?"

I replied, "Instead of cultivating a garden in the cemetery
plant a garden in your front yard. In addition to that adopt a baby."

A baby came along in three weeks that needed a mother, so
this lady took the boy and she got busy looking after her flower garden
and her boy and in the course of two or three months she was such a bloom-
ing handsome woman that she got married again. She reared that boy
and lived a long and happy life. I think she lived about forty years.

**QUESTION:** When sun baths do not brown or tan a white skin what is the cause?

**ANSWER:** Lack of pigment in the skin. However, you can get benefit from the sun just the same. Do not neglect the sun baths. It is not the tanning so much as it is the rays which go down through the skin into the tissues and into the bloodvessels and nerves.

**QUESTION:** In "The Margin of Safety in the Human Body" you say, "when once lost it can never be regained." How is this to be understood?

**ANSWER:** It is to be understood in this way: For instance, if you have been abusing your kidneys by the use of tobacco and mustard and pepper and alcohol and all kinds of wholesome things, eating quantities of beefsteak and other wholesome foods so that the kidneys are overworked, and you go on in this way year after year the kidney machine will be gradually worn out. The kidney is a wonderful machine.
Suppose this represents the kidney. These are the renal cells. Each one of these little cells makes about a tablespoonful of urine in 60 years. That is a lifetime job. There are about two million of them in each kidney. It takes one of these little kidney cells three months to make one drop of urine. Just think of what a delicate machine that is. It is easy to damage it and if you have been abusing the kidney with pepper sauce and mustard and ginger and hot things of all sorts and quantities of meat—the lean meat you eat nearly all of it has to go out through the kidney, for you make use of very little of it. There is enough protein in other foods so if you eat beefsteak along with other foods nearly all of it is surplus and has to be carried off through the kidney as waste matter and wears out these cells.

Now when a person has gone on in this way until he has worn out a large part of his cells—suppose this represents his complete outfit of kidney cells—suppose he has gone on until he has worn out these cells, until he has only a few of them left. You see at
the start he has more than he absolutely has to have. He has a
surplus of renal capacity. To show you how great surplus the average
man has I might tell you about the case of a man who came to my office
40 years ago. He told me he thought his boy had some trouble with his
kidneys. The boy was a young fellow about 16 years of age. He was
afraid he had some trouble with his kidneys. I said, "Bring up a 24
hour specimen and we will see what the trouble may be." So a couple of
days later I happened to glance out the window and saw a man coming
with a bushel basket on a truck and I wondered what it was. I inquired
about it. I never thought of such a thing as bringing a specimen.
Pretty soon he came into my office with a man helping him with a big
basket full of fruit jars full of urine, 28 pints. That was a 24 hour
specimen. I could hardly believe it. I investigated the matter and
found out sure enough it was really a 24 hour specimen. That young
man is alive to-day. That was 40 years ago and he is alive to-day
enjoying a fair degree of health. I told him how to live, I told
this boy how to conduct himself in such a way as to give his kidneys
as little work as possible to do, so instead of having beefsteak and pepper and mustard to eliminate it would be simply water. The kidneys can eliminate water very easily, but these other things are hard on the kidneys because they damage the kidneys when they are passing through. Pepper in your mouth smarts, doesn't it. It smarts in your mouth, doesn't it.

I remember meeting a friend of mine on the train, a college professor, a professor in a medical school, and he looked over my shoulder. I did not know what he was doing. I was dictating letters to my secretary and eating a little lunch. In those days you could not get wholesome food on dining cars, so I always took a little lunch along. I was eating my dinner, consisting of very simple foods that I always ate and pretty soon he spoke to me.

"Well," he said, "I have caught you at it at last. I have caught you at it at last. I have been wanting for years to know what you really ate."

"Yes," I said, "here is what I eat."

"Well," he said, "is that all you eat?"
I said, "It is enough, isn't it? Here is bread. That is the staff of life. Here are nuts. They are the beefsteak and butter. Here are apples. That is dessert, pie and cake and things."

He said, "Is that all you have?"

"Yes, that is all. I am having a good dinner." You do not know how sweet the bread was. It consisted of Zwieback, very dry. I was breaking off a bit and eating it.

"Well," he said, "it does not look to me as though there is very much flavor in that thing."

I said, "You don't know how sweet it is" and handed him a piece to eat. He chewed upon it but could not taste anything at all.

I said, "You have been up in the dining room eating mustard, pepper, pepper sauce and ginger."

"How do you know that?"

"I know it by your nose. You have a red nose."

"Well," he said, "Doctor, I admit it. I like things that give my palate a twist."

That is why I am telling you this story
"Well," I said, "the thing that twists your palate keeps right on twisting and gives the liver a twist and the heart a twist and the nerves a twist. It keeps right on twisting until it gets out.

He said, "I believe in having a good time."

That was 35 years ago. Two years ago that doctor wired me, "Doctor, I am sick. I would like to come to Battle Creek. I have had a stroke of apoplexy and I am getting better. Can you take me in?"

I wired him of course to come and so he came here. When he came into my office the first thing he said was "Doctor, remember my meeting you on the train 30 years ago."

I said, "I remember very well."

"Well," he said, "you know you told me something about the mustard, pepper, etc that I told you I liked because it twisted my palate. You told me it would keep right on twisting, and it did. But I have stopped. I do not eat any mustard or pepper any more and I do not smoke any more and I do not drink any more whiskey I used to drink. Now, I have had two strokes of apoplexy and am paralyzed on one side and I have got Bright's disease and I have got a very bad
heart, but I have stopped all of those things. I will be all right,
won't I?"

You see that is the trouble. His reserve was all gone, don't you see. When a man gets to the point where he feels that a habit is doing him harm it is because his reserve is used up. Nature does not allow any of her machinery to be interfered with in any way just as long as she can help it. For instance, if we examine the blood—when you come down in the morning before breakfast you had a little blood taken out of your arm to be examined. That was to find out how much work your kidneys are doing. The urine is examined to find out what is in the urine, what the kidneys have removed, but the blood is examined to find out what is left in the blood that the kidneys have not removed. That is very important because that determines the efficiency of the kidneys. The figures ought to be 28 for the non-protein nitrogen. That means the normal amount of urea and uric acid that is found in the blood, 28 milligrams in a hundred cubic centimeters of blood.

That is about 3 1/3 ounces of blood. That is the normal.
A gentleman was in to see me a day or two ago and I found his non-protein nitrogen was 53. Now, the kidney as long as it was possible to do so would keep it down to 28. When it begins to rise it is because so much of the kidney is damaged there is not enough kidney capacity to keep these poisons down to the normal limit.

If a man goes on with any wrong habit until he finds it is hurting him that is exactly like neglecting the fire that is burning in your house until the flames are bursting out through the roof.

Your capital is gone. It is like a man who had a large capital in a bank and he has kept drawing upon it extravagantly until by and by he has got to the point where his credit is gone.

He draws his check on the bank and the bank says to him, "You haven't got that amount of money here. That is what it means. When a person has gone on to that point he has suffered irreparable damage. He never can be restored to health again. He can be restored to such a point that by taking great care, by making the burden upon his vital organs as light as possible he can live very comfortably.
I remember a good many years ago a gentleman came into my office and wanted to talk to me. He said, "Doctor, I want to give you some advice. You know I am an old sinner. I come here and I get better and then I go back to my sins again, my tobacco, my beefsteak, etc. After I return home I get along all right for a while, but when I get feeling bad I come back here and take treatment and diet and I come right up again. You are living up so close to the line, your habits are so correct that by and by when you find yourself breaking down there will not be anything for you to do. You have done everything already.

You know Mark Twain said that bad habits were something you left off when you get sick. The time to leave off the bad habits is before you get sick. This gentleman went on and I went on. He died about twenty years ago and I am still going on.

I must tell you that I found it necessary to reform. I used to work 19 hours out of 24, sometimes 20 hours and sometimes 24. Sometimes I used to work continuously for 48 hours on a stretch without a minute's letup. I did not do that a great number of times,
but I occasionally did and it was my regular habit to work every minute
I could possibly keep my eyes open. I have reformed. For the last
few years instead of doing that I sleep seven or eight hours. Once in
a while I get an extra hour and I find it has improved my feeling and
general appearance so much that people think I am actually getting
younger because I used to be pale and thin because I was deprived so
much of sleep. Now by getting sleep enough I keep myself in much
finer physical condition than I used to. I kept that in reserve.
That was one thing I could stop doing so as to extend my existence
a little. But at the present time I mind my p's and q's very care-
fully. I try to live up to every rule of biology that I know about
because after having reached past three-quarters of a century I know
I have to walk carefully before the Lord. After one gets past 60 his
reserve is small.

When I see an old gray haired man smoking I shudder. If
that man could only see how little margin he has left and is burning
it up with that cigar. Every cigar cuts down his margin. Suppose,
for instance, a man has a hundred thousand dollars in the bank and throws away a thousand dollars. That is only one per cent. of what he is worth and he does not feel it at all; but by and by when he gets down to four thousand dollars in the bank and throws away a thousand it is 25 per cent. When he gets down to a thousand dollars and throws away a thousand it is half of all he is worth. When he gets down to a thousand dollars and throws away a thousand that is the end. That is the case with these people you see going about with gray hairs. They have only just a little margin left.

That is true of everybody no matter how old, for the time comes by and by when the margin is small and then, as I said before, it behooves a man to walk carefully before the Lord and to behave himself and to economize and save his vital machine in every way he can.

QUESTION: Will you kindly tell me if it is necessary to have a cataract removed?

ANSWER: Well, it just depends upon how far advanced it is.

If the cataract gets "ripe" as the saying is, it ought to be removed. You should consult a good oculist.
QUESTION: Would you advise one who has not hydrochloric acid in the stomach to eat avocados?

ANSWER: Yes, avocados are good for everybody.

QUESTION: Is it easier to keep the flora changed than to change it?

ANSWER: Yes, a great deal easier. After you get the flora changed a small amount of Lacto-Dextrin and a very careful antitoxic diet will keep the flora in a good condition. The important thing is to regulate the diet so that the residues will have no very offensive odor. A very offensive odor is evidence that the flora needs to be changed.

QUESTION: What causes asthma?

ANSWER: Sometimes asthma is due to the taking into the body a substance to which one is sensitized. One person may be sensitized to milk, another to horse dandruff, another to cat dandruff, another to feathers, and another to house dust. A person with asthma should be carefully sensitivity tested, which is very easily done, until you find out what is the particular thing to which he is sensitized.
QUESTION: How does the Sanitarium undertake to cure nervousness when there is no set cure for this ailment?

ANSWER: That is a very good question. So many people think there is something wrong with their nerves. I find that quite a large proportion of the people who come here are very sure that the trouble is with their nerves. They want a nerve doctor. The nerves are blamed for a great deal that does not belong to them. As a matter of fact the nerves are very rarely diseased. It is only now and then that we find a case in which the nerves are really diseased. The reason why so many people think they are suffering from a nervous disorder, nervous exhaustion or some other form of nervous exhaustion is because the nerves are the only organs of the body that can talk, and they have to talk for all the other bodily organs, you see. The nerves are the organs of sense. They are the only organs that can feel. The bones cannot feel. The liver cannot feel. The nerves are the only organs that can feel.

Suppose you hear a great noise on the telephone. The telephone keeps ringing and you go to the telephone and you listen
and hear a voice saying "Your house is on fire." You would not say, "Dear me, what is the matter with this telephone? What a wretched telephone this is to give me such news as that." You would not find fault with the telephone. I knew an old friend of mine who did. He was an old surgeon. I was his assistant for some time, a European surgeon. I was studying in Europe. He went to the telephone and got some bad news one day and seized the telephone and threw it upon the floor and stamped upon it and smashed the telephone. He would not have such interference with his comfort. But that is not the way to deal with telephones.

The nerves are in the same relation exactly. When you have a headache the trouble is not in your brain. The trouble is not with the head. That is not where the trouble is. Nobody thinks of complaining about his head being out of order because he has got a headache. Everybody knows that the trouble is somewhere else. It is his stomach or liver or some other part of the body. The headache is simply a consequence of some disturbance somewhere else.

The same thing is true of neuralgia. An eminent American
doctor practicing in France used to say "neuralgia is the cry of a hungry nerve for better blood." Good blood is needed, and that is where the trouble is rather than in the nerves. This thing is true with reference to other organs as well. When one has a disorder of the muscles, liver or joints, as a rule the trouble is not confined to the part in which the pain or distress or the disease is expressed, but it is a trouble of the entire body. When one has, for instance, a cold, it does not mean there is something wrong in your nose. The fault is not with your nose. The trouble is with the whole body. There is lowered resistance which has permitted you to contract this cold. The cold is an infection.

**QUESTION:** Is it possible to correct a disorder of the heart in which there are interrupted beats?

**ANSWER:** Sometimes, but not always. It depends upon the cause of the intermittent beats.

**QUESTION:** What causes neurasthenia?

**ANSWER:** Neurasthenia is caused by a neglected colon.

If you have a bad breath and a coated tongue you may be sure that
the trouble is down in the colon. So-called nervous exhaustion is usually toxic fatigue rather than a diseased condition of the nerves. If you get up in the morning feeling tired after having had a night's sleep you may know that the trouble is not with your nerves at all. It is toxic fatigue. The nerves are poisoned and the trouble will be found in the colon. Get the colon clear and keep it free from putrefying residues and changed the flora and the trouble will disappear.

I have seen that occur in thousands of cases, so I do not hesitate to tell you you can expect good results from correcting your diet and changing the intestinal flora.

**QUESTION:** Are there any benefits to be derived from chewing gum?

**ANSWER:** I hardly dare answer that question. Many years ago I admitted if a person had neglected to chew his dinner he might retire to some secluded place and do penance by chewing gum. It was less than a week before I had a letter from a man down in Vermont saying "I heard you use a great deal of gum and I have a ton and a half of good spruce gum I would like to sell you."
QUESTION: Is arthritis curable?

ANSWER: Yes, sunshine will cure arthritis, sunshine and proper diet. I have seen some very aggravated cases get well under the healing influence of the sun.
A good many years ago I happened to be in England and a very curious circumstance occurred. Mr. Chamberlain was in the city of Manchester and they gave him a great banquet. He was sitting beside the Lord Mayor and the people were having a good time chatting and smiling and eating their dinner. The Mayor said to Mr. Chamberlain, "Shall we have your speech now or should we let the people enjoy themselves a little longer."

So I felt as I was coming in that you were having such a lovely time smiling here that I would let you smile a little longer. I hope you will keep right on smiling while I get into this melancholy question box. It takes a good deal of courage to face this box. Every Monday night for over fifty years I have had to walk up to face this unknown quantity. We always find something new, but it is not always interesting.

**QUESTION:** What is the medical value of sauerkraut?

**ANSWER:** The medical value of sauerkraut is zero. Sauerkraut is salt. That is about all there is to be said about it, salt and sour. There is very little more to be said about it. It has almost no food value, and the juices which it contains, while they represent
a little something of nutritive value, it is so very small it cannot be said to be of any special value. A person would starve to death, inevitably, on a diet of sauerkraut.

**QUESTION:** Should Food-Ferrin be taken through a tube?

**ANSWER:** No; it is not necessary to take it through a tube. It can be taken diluted with a little water and it is not likely to do the teeth any harm.

**QUESTION:** How often should the bowels move every day?

**ANSWER:** After every meal. The food residues should be evacuated after every meal at least. A little more often would do no harm. I do not know of anything more important than this practice. We in this country are accustomed to keep matters of that sort entirely out of sight, but in that respect we are different from almost any other people in the world. The Japanese and Chinese and Oriental people generally have much more respect for the bodily functions and give much more attention to caring for these necessary functions of the body than so-called more civilized people, more cultured countries. In Japan, for example, when a person calls at the house you will find there are
two provisions made for the disposal of food residues, one close at
the front door right opening off the parlor and another in the rear.
The one in the rear is for the use of the family and the one at the
front door is for the use of guests and callers, and if a young man
is calling on his young lady friend and he has to visit the toilet he
does not hesitate at all to ask for the honorable blushing place. They
call this the honorable modesty place, and a young lady often receives
as a wedding present a very nice little sack highly ornamented which is
used for carrying toilet paper. That is considered a very proper thing.

In India—I might tell you about that. A man who lived
there right among the natives for 25 or 30 years in their homes and
was thoroughly acquainted with their habits told me some time ago that
the first thing the native says to his employer is "Good morning, sir.
I have had a good night's sleep, I have had an excellent bowel movement,
I have had my breakfast and now I am ready for work." He said that this
is the ordinary morning salutation and that it is customary in the whole
country.

A man gets up in the morning and the first thing he does
is to take a little pitcher of water and retire to the fields and evacuates his bowels and then gives himself a thorough cleansing.

That is a part of his religious duty. One of the duties of the priest is to teach the people the importance of regular and thorough bowel movements and the care of their bodies. That is one of the special duties of the priest.

If a man gets up in the morning and his bowels do not move he does not go to work. He stays at home and attends to that as his first duty. He would not think of going to work unless he has had a thorough evacuation. As a result the people of India are almost entirely free of cancer of the colon and cancer of the stomach. In fact, cancer in general is very rare in that country. The people give so much attention, so much care and thought to this matter that they consider Europeans very untidy indeed. They look upon them as thoroughly unclean and they are filthy in their habits because they do not make use of water always after evacuation of the bowels.

Now, the question is How often should the bowels move?

I think there is no question in relation to personal habits so important
as this question of ridding oneself of the residues of the food, for
food will undergo the same decomposition in that body as it will undergo
outside of the body. Very few people are aware of the fact very familiar
to bacteriologists that about one-seventh of all the meat eaten undergoes
putrefaction. As a matter of fact the great objection to eating meat is
what happens to the undigested residues of meat. That is the objection to
meat eating. One-seventh of it undergoes the same sort of putrefaction
in the body that it would undergo outside of the body and with the
same conditions of warmth and moisture. Now, suppose you had a beef-
steak in your pocket and carried it around in your pocket. In a f
days it would get into a most unwholesome condition and you would be
likely to be arrested as a public nuisance. The beefsteak undergoes
the same changes in the body only more intense. It decays more rapidly
when it is left in the body. So it is of the utmost consequence that
these residues of food that reach the colon should be disposed of promptly.

I will make a little sketch of the colon here to show you how
important it is. Suppose this is the colon, here is the stomach, here
is the small intestine, and here is the ileocecal valve. The stomach
is the kitchen of the body, the small intestine is the dining room, the colon is the sewer, or the garbage box, if you please. Eight hours from the time the food is eaten the residues of that meal are deposited here in the colon. For instance you take your breakfast at eight o’clock in the morning. Here it is in the stomach. By four o’clock in the afternoon the residues of that meal will be found here in the colon. The food has been digested, all the usable part has been absorbed and the useless residue is here ready to be disposed of. Now, the residue of one meal should be dismissed after every meal. Why? For the reason that when food is taken into the mouth and chewing begins, we begin to taste it and the salivary glands begin to work. the jaws are crushing the food, at the same time the stomach begins to work and the small intestine also begins to work. A wave of activity passes down the whole length of the alimentary canal. If you could see the stomach under the x-ray you will see it changing its form. A wave will start up here and travel down across the stomach and that wave goes all the way down and reaches the colon. Almost the moment you begin to eat movements begin in the colon and so the residues are carried forward. This is what is known as the eating
reflex or gastrocolic reflex as Dr. Hurst called it. He discovered this about fifteen years ago. Dr. Hurst discovered that the residues in the colon move forward four times as rapidly during the taking of a meal as at any other time. In fact, Dr. Hurst was of the opinion that almost all the forward movement of the residues in the colon takes place during the taking of food. That is one reason for taking plenty of time to eat, for taking time to chew your food in a thoroughgoing way. It is not only to chew the food and comminute the food but so as to give opportunity for the proper forwarding of the food residues in the colon.

Now, when food is taken in the proper way the time that these residues remain in the body will be very brief. For example take breakfast at eight o'clock in the morning and then take dinner say at one o'clock and supper at six o'clock and before bedtime, ten o'clock, you will see there will be ample time for these residues to have reached the colon and be dismissed. That is fourteen hours. You see that is ample time because the residues reach the colon in eight hours and that allows six hours more for the residues to be carried on and evacuated from the body.

When breakfast is eaten, by twelve o'clock all of this breakfast is down
here in that lower part of the small intestine, and so when you take
dinner at one o'clock this movement that comes down rapidly carries these
residues onward into the colon. They slowly work along. Then when supper
is taken another impulse comes along and ought to carry the residues out
of the body by ten o'clock at night. This can be seen under the x-ray.
The x-ray examination shows that this is what actually takes place. The
x-ray examination also shows that when the bowels move but once a day
instead of after every meal an evacuation does not occur until after
53 or 54 hours. In the meantime there has been beside breakfast, dinner
and supper to-day, breakfast, dinner and supper to-morrow and breakfast
and dinner the next day and after dinner day after to-morrow there will
be a bowel movement instead of up here where it should have been, so this
allows the accumulation of all these residues.

That is why the colon becomes enlarged. I will show you some
of the mischief that occurs because of this abused colon. One of the first
is overstretching of the cecum. The cecum ordinarily holds about as much
as the palm of the hand, but because of this abuse it becomes dilated
until it holds one or two quarts and it often presses down upon the colon
so that the colon becomes compressed and obstructed, seriously
obstructed, and as a result we have here a very serious thing.
Instead of having here a normal ileocecal valve, a check valve
to keep the residues from backing up, instead of that the bowel
is stretched here and the small intestine is stretched. This
valve is broken down so that we have here no check at all to
the backing up of these residues and the residues coming down in
the colon here and undergoing putrefaction begin to back up.
They back up into the small intestine all the way up here and
by and by even get up to the stomach itself, and that is
undoubtedly, in a great number of cases at least, the cause
of gallstones. The infection gets up here to the gall duct,
gets down into the gallbladder and when we examine the gall-
stones we always find colon germs in the center of the gallstones.
Gallstones are due to infection and gallbladder troubles are
mostly due to this very thing.

So you see disposal of residues is almost as important
as the taking of food. One of the first duties of a mother
should be to train her children to this regular and systematic evacuation of the colon. The fact is most of these colon troubles begin in early childhood, often begin in infancy.

I was reading in a medical journal not long ago in answer to a question of a mother. She asked the editor of the journal "What should be done to relieve constipation in infants?" The editor said, "Do not trouble yourself about the baby's bowels. If they move once in a couple of days it will be all right." Now, this poor baby was being trained into indigestion. Its whole life was being crippled by this false idea that the retention of these evacuations is not a matter of any consequence.

The savage mother takes great care to train her baby to move its bowels in a natural way and several times a day. The baby's bowels move every time it is fed. This is true of animals generally. Horses and other animals always move their bowels after eating.

One day in London about 25 years ago it occurred to me to go up to the zoological garden to see what were the bowel
habits of the big apes. I was very much surprised when I asked the keeper "How about the bowel movements"—I was looking at the monkeys at that time. "How often do these monkeys have bowel movements?"

He said, "Twelve to 14 times a day."

I said, "Are you sure of that?"

"Yes, I am sure of it. It is a matter to which I have given a great deal of attention."

I said, "How about the big apes. How often do their bowels move?"

"Four times a day."

I said, "How do you know?"

"I have to take care of their cages," he said. "I have to give the matter attention and I know that that is their regular habit. If they do not move four times a day I know there is something wrong and I must changed their diet."

"What do you give your apes when their bowels do not move as often as they ought? Do you give them medicine?"
"No, I give them onions."

Monkeys are very fond of onions.

In Washington I called at the zoological garden and made the same inquiry. I was told there that the big apes, the big chimpanzee Soko moved its bowels regularly four to six times a day.

I asked the keeper, "Suppose its bowels do not move so often, what then?"

"Why," he said, "the ape acts as though he did not feel well. He behaves as though he had a headache. He is dumpish and does not exercise. He acts very dumpish and we have to give him a dish of onions and that will give him relief."

So this is really a matter of importance because it is a natural function being disturbed. About the first thing a mother does for a baby is to housebreak it. If your dog is going to stay in the house he is housebroken. The result is all these house dogs are constipated. Babies become constipated in the same way. When the natural impulse for movement of the bowels is opposed, for instance, when this wave comes down which carries the residues forward the result is it will back up, or at least an impulse travels back and sometimes the
material travels back. When this valve, the ileocecal valve, is broken down it is carried clear back to the stomach. X-ray examinations have actually shown that residues that were visible here in the colon have been found here clear back in the stomach the next morning after the observation was made.

I do not know
# American Potato Journal

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Why We Should Eat More Potatoes

JOHN HARVEY KELLOGG, M. D., LL. D., F. A. C. S., Medical Director
Battle Creek Sanitarium

Since Count Rumford, a New England Yankee, soon after the close of the American Revolution, taught the people of Bavaria to make potato soup, the potato has steadily grown in popularity in central European countries. During the Great War, the potato rendered the same service to Germany that corn did to this country. The per capita production of potatoes in Germany before the war was 24 bushels, whereas in this country we produce for each inhabitant scarcely four bushels per annum.

In this country we have not yet begun to appreciate the value of the potato as an article of food. The Americans are essentially grain eaters. There are many reasons for this. The potato requires intensive cultivation and much hand labor, whereas cereals can be readily produced in enormous quantities by the use of machinery alone. Cereals, particularly corn, wheat and oats, have been extensively exploited by great manufacturing companies, and the American people through the medium of magazine and newspaper advertising have been educated in the use of cereals to such an extent that ready-to-eat foods prepared from wheat or corn have become the conventional staples of the American breakfast and fill a large share of the space on grocers' shelves.

These breakfast foods have performed a most useful service for the American people by lessening the consumption of butchers' meat and replacing to a large extent the indigestible fried dishes of various sorts which formerly constituted the American breakfast, and have no doubt been a factor in the marked lowering of the American death rate which has occurred within the last few years. Nevertheless it must be ad-
mitted that while bread has for ages enjoyed its deserved reputation as the staff of life, it is not altogether commendable as a chief source of human nourishment. The profound studies of our nutrient needs which have been made in recent times by numerous eminent investigators have shown that cereals possess certain characteristic qualities which render their too free use not only undesirable but a possible source of serious systemic injury.

More than 30 years ago the eminent Swiss bio-chemist Professor Bunge called attention to the fact that because of the great excess of phosphoric acid in cereals their free use tends to lessen the normal alkalinity of the blood and tissue fluids, thus working great injury, for nothing is more important for good nutrition, resistance to disease, high efficiency, endurance and longevity than the maintenance of a high standard of blood alkalinity. When the alkalinity is lowered by the overaccumulation of acids in the blood and tissue fluids, there is increased susceptibility to colds, to influenza and to such maladies as pneumonia and other grave acute diseases. The chance of recovery from an attack of infectious disease such as typhoid fever or influenza, is greatly lessened when the blood alkalinity is lowered. The chief reason for this is that the blood is our chief defense against the attacks of germs which give rise to infectious disease. When the blood is invaded by these enemies of life and health, certain of the blood cells, known as leukocytes, attack the bacteria and if successful destroy them. The fighting ability of the blood cells in their defensive battle depends upon the state of the blood. When it is normally alkaline the leukocytes are highly active and pursue and destroy the invading bacteria with great vigor, but when the alkalinity of the blood is lowered by an excessive intake of unoxidizable acids such as the phosphoric acids found in great excess in wheat, corn and other cereals, the fighting power of the blood cells is diminished.

It is now believed by many eminent investigators that an excess of acids circulating in the blood tends to cause premature hardening of the arteries, or arteriosclerosis, and in this way encourages the development of Bright’s disease and other degenerative maladies.

Although the preponderance of acids in cereals was pointed out many years ago by Bunge and other authorities, it is only within the last few years that their importance has come to be appreciated by students of human dietetics. This has led to an exhaustive study of foodstuffs with special reference to their alkaline and acid properties.

The character of a food is shown by its ash. Food is body fuel and when burned in the body leaves a residue or ash the
same as when burned in the ordinary way. The acids and bases, or alkalies which compose this residue, are chiefly eliminated by the kidneys. When this ash contains a preponderance of acids, as in the case of cereals, the effect of the food is to lessen the alkalinity of the blood. On the other hand, when bases, or alkalies, predominate in the ash, the effect of the blood is to increase alkalinity and in so doing to increase resistance to disease, vigor and endurance.

The ash of the potato is more highly alkaline than that of any other of our common foodstuffs, its ash containing about ten times as much potash as does that of fine flour bread. This fact gives to the potato great importance as a dietetic means of maintaining the alkalinity of the blood and tissue fluids, which modern science has shown to be so important that a loss of alkalinity so great as the difference between ordinary pipe water and distilled water, will cause instant death.

It is not to be understood, of course, that cereal foods should be altogether avoided as unwholesome. They become injurious only when too freely used and made to constitute the major part of the diet, and especially when used in conjunction with meats or eggs. It is only necessary to bear in mind that cereals of all sorts are acidifying foods, and to combine with them other foods in which the alkalies predominate. Alkalies are found in large excess in the ash of fruits and vegetables of all sorts, but the potato is particularly rich in alkaline elements and hence is perhaps better suited than any other foodstuffs for neutralizing the excessive acidity of cereals. Milk is a neutral substance; hence the oatmeal, milk and potato diet of the Irishman is a well balanced and physiologic dietary, and it is doubtless to this fact that the Irish owe their great vitality and endurance and, particularly, their wonderful longevity, which exceeds that of any other European nation, with the exception of the natives of Bulgaria, whose diet is very similar.

A bread and meat dietary, however, as has been frequently pointed out by McCollum, and, as the writer has maintained for more than half a century, is most unwholesome. Bread supplies acids in excess, and steaks, chops and meats of all sorts, contain a still greater excess of acids. Many cases of Bright’s disease give a history of liberal meat consumption and scanty use of vegetables and fruits, and thousands of doctors are daily saying to their patients, “Cut out meats.” Scientific and up-to-date doctors are beginning to add to the instruction to avoid meats, “Eat more potatoes.”

Another unphysiologic combination is the common breakfast dish, poached egg on toast. Both eggs and bread are highly acid foods and their use tends to surcharge the blood and tissues with acids, and to burden the kidneys with superfluous
work, since one important function of these organs is to maintain the alkalinity of the blood at a proper level by removing any excess of acids.

Substituting the potato for bread, we have in the alkaline tuber and eggs, an entirely wholesome combination, since the alkalinity of the potato will balance and neutralize the acidity of the egg. For a complete balance, one small potato is required for each egg. From the standpoint of palatability, the egg-potato combination is entirely satisfactory.

The effect of a diet upon the alkalinity of the body fluids, is readily shown by the urine. Acid foods increase the acidity of the urine, while alkaline foods lower the acidity. The acidity of the urine is thus an indicator of the effect of a diet upon the tissue fluids. The urine of persons who subsist largely upon cereals and meat or eggs, is always highly acid. Not infrequently the urine of such a person will be found to be fifty times as acid as it ought to be or even a hundred times more acid than normal. The labor of eliminating this enormous excess of acid wears the kidney out prematurely and undoubtedly shortens life, and greatly lessens efficiency.

The writer has no doubt that this is one of the great causes of the steadily lessening maximum longevity in this country. Centenarians are rapidly disappearing. Potato-eating Ireland furnishes more examples of great longevity than any other European country except Hungary.

The writer has for many years advocated very strongly an increased consumption of potatoes, replacing a part of the bread and other cereals which now enter so largely into the American bill of fare. The effort that is being made by the Potato Association of America to promote the cultivation of this wonderful tuber, is highly commendable and will undoubtedly result in greatly improving the health and efficiency of the American people.

Editor’s Note—This is the first of a series of articles by Doctor Kellogg. The next article will appear in an early issue of the American Potato Journal.

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Annual Meeting December 27-29, 1928

The fifteenth Annual Meeting of the Potato Association of American will be held in New York City, December 27-29, 1928. Detailed announcement of the meeting will be made in the November American Potato Journal.

It is urged that those contributing papers for this meeting communicate with the secretary at once and that abstracts of papers be filed with the secretary on or before October 15, 1928.
How Late Should We Spray Our Potato Fields?

W.M. STUART, United States Department of Agriculture, Washington, D. C.

The question as to when it is safe to discontinue the application of liquid or dry bordeaux mixture as a protection against late blight is one which has to be decided each season by each individual potato grower. Many years observation has shown conclusively that all too frequently growers have ceased spraying before it was really safe and as a result have in many instances suffered heavy losses through late blight infection of the tubers when perhaps an additional application might have largely, if not entirely, prevented the infection.

In some respects a late attack of late blight is much more serious in its consequences than a midsummer attack of similar severity on the foliage of the plants. On first thought this statement may seem untrue, but it is believed, however, that in most cases it can be sustained. Generally a midseason attack of late blight is followed by a period of warm dry weather which checks the progress of the disease and kills the spores which have fallen on the surface of the ground. If no heavy rains have occurred prior to the destruction of the spores and if the crop was not foolishly harvested when the disease was in an active stage of growth there will be little or no late blight decay of the tubers.

The folly of harvesting potato fields attacked by late blight was well exemplified in Aroostook County, Maine, in 1927, when an attempt was made in August to harvest and market some Irish Cobbler potato fields in which late blight was still active with the result that several carloads of this stock had to be dumped in Boston harbor because such a large proportion of the potatoes had developed tuber rot. This experience put a stop to further harvesting activities until later in the season when the disease had died out, at which time a negligible per cent of tubers were found to have been infected with late blight. The loss sustained from a midseason attack of late blight is therefore directly proportional to the severity of the leaf and stem infection and the consequent effect such injury has on the further development of the tubers.

On well sprayed fields there should of course be little if any foliage injury because if the grower has a good power sprayer his spray program calls for frequent applications during the midseason growth of the plants. In far too many instances, however, the grower feels that his spray job is completed when the plants have reached their full development as to size and are beginning to show signs of ripening. If during the period intervening between this stage and that of complete ripening
of the plants the right kind of temperature and moisture conditions prevail there is almost certain to be an attack of the disease in late blight infected regions.

It is never safe, therefore, in such regions to discontinue bordeaux applications as long as there are green leaves on the plants for even a light infection at this time may result in tuber rot. The word may is intentionally used in the preceding sentence because infection of the tubers is dependent on two factors: (a) heavy rains which may bring live spores in contact with the tubers and (b) harvesting the crop when late blight spores are abundant on the surface of the ground or on the plants themselves. In the operation of digging the crop the potatoes inevitably come in contact with some of these spores and wherever the surface of the skin is broken it affords a possible invasion of the disease with a consequent decay of the tubers. Furthermore, and this is the serious feature of it, such infection cannot be immediately detected and as has already been shown results in loss to the shipper if moved immediately to market. On the other hand if the crop is stored the grower is almost certain to have the rather doubtful privilege of carrying out a considerable proportion of decayed tubers during the storage period. Frequently these losses may amount to 25 or even 50 per cent of the entire crop.

There is another angle to tuber infection at time of harvest which should be mentioned and that is the extreme difficulty of detecting every infected tuber when grading them for market. Some buyers refuse to handle such potatoes knowingly, as they invariably are a source of grief to the shipper.

A brief comparison of the relative effect of a midseason and late attack of late blight shows that the former arrests the growth of the plants and consequently cuts down the yield but causes little if any injury to the tubers unless very heavy rains occur or the grower is unwise enough to harvest the crop when live spores are still present. In the case of a late attack it is often so mild as to be unsuspected and as the infection occurs at or about the time the tubers have reached full development there is little reduction in yield. The chief loss is from tuber decay which in many instances is probably unavoidable so far as postponement of digging is concerned because in many cases it is a choice between late blight tuber infection or field frost injury.

In this discussion the sole object has been to emphasize the danger of discontinuing the spray program while the plants are still alive. Such a procedure might be perfectly safe three years out of five but in late blight regions no grower can afford to take the chance of having his crop attacked by this disease toward the end of the growing season unless weather conditions are such to preclude the possibility of infection.
Even in such cases the grower must be prepared to resume spraying at the first suggestion of late blight weather conditions. It is doubtful, therefore, whether the saving of one or more additional spray applications is justifiable under even the most favorable conditions.

Weed Control and the Potato Virus Problem

W. D. VALLEAU and E. M. JOHNSON, University of Kentucky, Lexington

In raising certified seed potatoes the most important consideration in Kentucky, and perhaps likewise in the more northern potato sections, is obtaining a stock of seed potatoes relatively free from virus or degeneration diseases. The grower is not so much concerned with distinguishing the types of virus disease as he is with methods of their elimination. The standard method of eliminating virus diseases is that of pulling out, as soon as recognized, all diseased plants and removing them from the field. This method, while proving highly successful from a commercial standpoint, has not been as successful as might be expected from the standpoint of complete elimination of the disease.

It appears probable, under Kentucky conditions, that a feature of importance in lowering the effectiveness of roguing may be the presence of certain weeds commonly present in potato fields, which may act as reservoirs of infection from year to year.

While the evidence for infection of potatoes from weeds is not conclusive, it appears to be sufficient to raise the question as to whether the potato grower would care to take the risk of leaving the weeds in the vicinity of his high-grade potato stock when a little extra work will eliminate them and the consequent danger to potatoes.

In working with the virus diseases of tobacco, the writers have found that certain of them are always more abundant in or near fields where potatoes have previously been grown for several years. In one field, for example, where Cobblers have been grown from time to time for the past 14 years and carefully rogued during that time, five virus diseases developed in abundance in tobacco, of which three, at least, go readily to potatoes and may be transferred from them again to tobacco. A field on the Experiment Station farm at Lexington has been under observation for several years, in which at least nine virus diseases, other than the true tobacco mosaic, develop each year in tobacco. A portion of this field was planted to a po-
tato variety test for at least two years, about 20 years ago. The pasture connecting the two parts of the field has been in blue-grass continuously since that time and is nearly a mat of horse-nettles (*Solanum carolinense*) and contains numerous ground-cherrys (*Physalis sp.*). Many individuals of both species are infected with a virus. The supposition is that the weeds became infected from the potatoes at that time and, as they are perennials, have carried the diseases since that time. That the virus diseases of tobacco, grown in the vicinity of this field, originate largely from the weeds has been clearly demonstrated, both by transferring the viruses from the weeds to tobacco and back to weeds again and also by eliminating the weeds and about one tobacco field, thereby nearly completely controlling these virus diseases, and allowing them to remain in and about another tobacco plot with the result that, by the middle of summer, the tobacco in the later was fully 85 per cent infected.

The fact that several of these virus diseases may be transferred to virus free seedling potatoes and then retransferred to healthy tobacco and that the viruses may likewise be obtained from naturally infected weeds or transferred to healthy weeds, where symptoms are produced, seems to be sufficient evidence to warrant the recommendation that as much attention be given to the elimination of these two genera of perennial weeds as is usually given to the elimination of potato plants known to be infected with one or another of the virus diseases.

The problem of elimination of these weeds is not so simple as would at first appear. They sometimes root as deeply as 30 inches, and in some cases when cut off 16 inches below the surface have been found capable of pushing up through this amount of packed soil. In sod, however, they appear to send rootstocks for a considerable distance parallel to the surface and not to root so deeply. In cultivated fields, where clean culture is used continuously, the rootstocks are plowed up and cut into small pieces in working the sod, and each of these is then capable of growing and making a vigorous plant. The method which we have employed in cultivated fields, in ridding them of the weeds, is to dig each individual plant with a spade, preferably a tilling spade, put it into a sack hung over the shoulder and, when the sack is full, carry it to the road where it is emptied. Here, in the sun, the roots rapidly die. As the chief method of propagation, in cultivated fields, seems to be by these cuttings of rootstocks rather than by seed, the method, although tedious the first time over the field, becomes simple from that time on. Removal in pastures is not so simple, but the weeds have been markedly reduced by pulling the plants up, thus breaking the individuals off at the underground rootstock. In this way they become weakened and have less chance
of survival in competition with grass than when left un-
molested.

In Kentucky, where only second-crop potatoes are used for seed, if the weeds are removed from cultivated fields by hand, they may very probably be handled in nearby pastures by allowing them to grow to the flowering stage, when they may be moved close to the ground just before second-crop seed pota-
toes are planted. Then, pulling by hand in pasture land in the vicinity of potato fields or one or two more mowings during the fall should be effective in eliminating them as sources of in-
fection to nearby potatoes.

While it has not been clearly demonstrated that the weeds do act as a source of the virus diseases of potatoes, the evidence seems sufficiently conclusive to warrant their complete destruc-
tion on farms where certified seed potato stock is being grown year after year.

The New Jersey Potato Industry

W. C. LYNX. New Jersey Department of Agriculture. Trenton

If production figures alone were taken into consideration, the fact that New Jersey annually accounts for two per cent of the national production of potatoes would indicate that this state is relatively unimportant in this line of agriculture. Actually, however, a limited seasonal production creates an importance worthy of consideration. New Jersey potatoes are available in a few markets for ten or eleven months in the year, but approximately 80 per cent of the annual crop is classed as "second early," and for the most part is marketed between the last few days of July and the middle of September. During the past five years one-fourth of the country's August shipments have originated in this state.

The commercial producing area of the state is in two dis-
tricts. The more important of these, known as "Central Jer-
sey," is comprised of Mercer, Middlesex and Monmouth counties, and extends east from Trenton to within a few miles of the coast. The other district, known as "South Jersey," in-
cluding Cumberland and Salem counties, is about thirty miles south of Philadelphia just east of the Delaware River. There are two other counties lying between these two districts which are producers of a second early crop, but which truck to nearby markets, principally Philadelphia, and do not ship in carlots.
Changes in Variety

A radical change has taken place in the potato industry of the state within the past few years. Ten years ago the major commercial variety grown in Central Jersey was the American Giant, with only small acreages of Irish Cobbler and Green Mountain in evidence. Today the situation is reversed. Most of the commercial acreage in that section now is Cobbler, and American Giant acreage has practically disappeared, comprising less than one per cent of the total. In the same period Green Mountain acreage has also made some increase. The American Giant was of inferior quality but was grown largely because it was believed to be more scab resistant and a better yielder than the Green Mountain or the Irish Cobbler. Experiment Station tests over the last six years have demonstrated that it is more resistant to scab but that is not a better yielding variety. These tests, which included a number of strains of each variety, showed an average yield over a five-year period (1921 to 1925 inclusive) of 189.3 bushels for American Giants, 192.4 for Irish Cobblers and 203.8 for Green Mountains. Quoting from Experiment Station Bulletin No. 454, which gives details as to these tests, "Very little effort has been made to improve the American Giant whereas all of the seed-growing sections have been devoting considerable attention to the production of the Irish Cobbler and the Green Mountain varieties. This unquestionably accounts for the fact that the two latter varieties have given larger yields than the former. The fact that the American Giant will not yield as well as the Green Mountain or Irish Cobbler and particularly the fact that the quality of these two varieties is greatly superior is sufficient reason for discarding the American Giant."

The commercial crop in South Jersey has for some years consisted almost entirely of Cobbler stock, although a few Green Mountains are grown. A late crop, planted in July, is produced in this section and moves by truck to nearby markets. For this crop the New Jersey Red Skin is commonly grown and usually finds a ready sale through those outlets.

For more than a decade prior to 1923 the total acreage of potatoes in the state ranged from 80,000 to 95,000 acres; in the latter part of this period following the war, the potato industry here was in a very unhealthy condition, with the result that many growers experienced heavy financial reverses. Since 1923 the total acreage has declined to between 50,000 and 60,000 acres. This reduction, together with the adoption of varieties of better quality, and improved cultural methods, has tended to stabilize the industry and placed it on a sounder basis.

Marketing

The commercial sections previously described begin shipping
carlots the last week in July, although no appreciable quantity is moved until early in August. Peak shipments occur in this month, usually between the 10th and 20th. Movement generally continues heavy until the end of the month, and by the middle of September almost all of the crop has been marketed. The heaviest daily shipments from New Jersey in 1927 amounted to 350 cars, which amount was shipped on two days, the 11th and the 17th of August.

A considerable proportion of the season’s movement is through the hands of local dealers, although some large growers market their own production direct. The usual custom at the larger shipping points, at which a number of dealers operate, is for the grower to deliver his loads at a dealer’s platform or warehouse where the stock is graded and the grower credited with a price based on the current market. Grading machines are in common use and many of the larger growers sack their stock at the farm and either sell direct or load on cars which are bought by dealers or sold on account. Field grading is practiced to a certain extent and is more prevalent in some localities than in others. However, the stock is sufficiently matured and the skins reasonably tight so that with ordinary care in handling there is no damage from machine grading. All rail movements today is in the common 150-lb. sack, loaded 200 to the car. Branded sacks, the use of which is an accepted principle in better marketing, are also in common use.

Distribution

During the past five years New Jersey has shipped an average of 6,000 cars annually. This is only half of the average quantity shipped yearly during the previous five-year period of 1918-1922, when the acreage ranged from 80,000 to 95,000 acres. This fifty per cent decrease is due not only to reduction in acreage but also to increasing movement by truck. Ordinarily, about half of the annual rail movement from New Jersey occurred in the month of August, but lately, with decreased shipments and increased competition, the August rail movement has comprised about three-fourths of the yearly shipments; the remainder roll mostly in early September and some in the last few days in July.

Ten years ago, during the height of New Jersey’s heavy production of the American Giant, western markets were important receivers of potatoes from this state. In 1916 Chicago reported 1,100 cars from New Jersey, and Pittsburgh, Cincinnati, St. Louis and other western cities also bought large quantities. Since that time the amount of New Jersey stock sold in that area has dropped appreciably due to the poor variety grown and to new local sections opening up, offering competition with better quality. This loss of business is best reflected
by figures. In 1925, for example, only three cars of Jersey stock were unloaded in Chicago and but eight cars in 1926. In the latter year Detroit received 26 cars, Boston 38, Cincinnati six, and Milwaukee, Birmingham and New Orleans none.

Even with the great improvement in quality through complete variety change it has been difficult to regain many of the markets which a few years ago were important outlets for New Jersey producers. Last year, however, a great deal was accomplished along this line, and with good grading these regained markets should be held and many new ones added. Market conditions in 1927 were one of the uncontrollable factors which to some extent favored New Jersey distribution. The larger nearby markets were not in condition to handle as many cars as in 1926, which was a shorter crop year than usual. Consequently considerable effort was made to reach out to greater distances. Last year, therefore, markets in all of the states east of the Mississippi River, with the exception of the State of Mississippi, received varying amounts of New Jersey potatoes, and also two states further west, Louisiana and Texas. Increases in a few important markets, some of which are distant, together with decreases in nearby large outlets under poorer market conditions, are shown in the following table:

<table>
<thead>
<tr>
<th>Market</th>
<th>1926</th>
<th>1927</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akron</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>Albany</td>
<td>34</td>
<td>55</td>
</tr>
<tr>
<td>Birmingham</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Boston</td>
<td>38</td>
<td>495</td>
</tr>
<tr>
<td>Chicago</td>
<td>8</td>
<td>151</td>
</tr>
<tr>
<td>Cleveland</td>
<td>202</td>
<td>225</td>
</tr>
<tr>
<td>Columbus</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>Detroit</td>
<td>26</td>
<td>223</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Newark</td>
<td>250</td>
<td>271</td>
</tr>
<tr>
<td>New Haven</td>
<td>1</td>
<td>46</td>
</tr>
<tr>
<td>New Orleans</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Scranton</td>
<td>90</td>
<td>133</td>
</tr>
<tr>
<td>Tampa</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>Wilkes Barre</td>
<td>83</td>
<td>121</td>
</tr>
<tr>
<td>Worcester</td>
<td>21</td>
<td>52</td>
</tr>
<tr>
<td>Youngstown</td>
<td>49</td>
<td>76</td>
</tr>
<tr>
<td>Baltimore</td>
<td>106</td>
<td>59</td>
</tr>
<tr>
<td>Buffalo</td>
<td>156</td>
<td>72</td>
</tr>
<tr>
<td>New York</td>
<td>226</td>
<td>185</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>387</td>
<td>334</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>375</td>
<td>336</td>
</tr>
<tr>
<td>Washington</td>
<td>199</td>
<td>125</td>
</tr>
</tbody>
</table>
In the last five years there has been a noticeable increase in the movement of the commercial crop by truck, and the innumerable local outlets offer possibilities for a still greater increase in this method of transportation. These outlets form a vast consuming power, for within a radius of sixty miles of Trenton there is centered one-tenth of the population of the United States. The usual quantity loaded on trucks for market delivery is 100 sacks but some six-wheel trucks in operation now carry 200 sacks, which is equal to a carload by rail. There are no definite figures regarding the quantity of potatoes trucked to market, but the general impression is that it is constantly growing. Taking the crop as a whole, including some stock produced for winter sale, an average of 53 per cent of the five crops from 1918 to 1922 were shipped by rail; from 1923 to the present time this proportion by rail has dropped to take in but 38 per cent of the state’s production.

In considering truck movement of the second early crop which constitutes the majority of New Jersey’s production, there are three separate sections to be taken into account. In Central Jersey the present proportion shipped by rail is 64 per cent, leaving approximately two-thirds to be marketed locally, including truck movement. In the South Jersey area the greater proportion of the commercial crop is trucked to market, only 38 per cent moving by rail. Between the Central and South Jersey sections are two counties which annually produce about one million bushels of the state’s commercial crop. However, practically no carloads move out of these counties and almost all of the stock is sold in or through the Philadelphia market in five-eights bushel baskets.

**Competition**

New Jersey has several formidable competitors among the second-early potato producers, best illustrated by the fact that in August 1927 the Eastern Shore of Virginia and Maryland shipped 1996 cars, Long Island 1554 and Kansas 1456. These three districts and New Jersey collectively accounted for 56 per cent of the total forwardings in the country for that month. Most of the remainder originated in Minnesota, Missouri and several Mountain and Pacific states. The movement from the Eastern Shore occurred of course during the first two weeks of the month, but represented an overlapping of seasons in the two areas. The Long Island carlot movement was much below that of New Jersey during the same period but considerable trucking from the Island to metropolitan markets increased the amount of competitive stock on hand. The majority of the Kansas stock moved in July along with the bulk of the Eastern Shore shipments, but nevertheless was present in sufficient quantity on some mid-western markets to compete
with New Jersey shipments to that section of the country in August. The following table showing average daily carlot movement from the several areas in 1927 illustrates in figures the competition from those states:

<table>
<thead>
<tr>
<th>Week of</th>
<th>Eastern Shore</th>
<th>New Jersey</th>
<th>Long Island</th>
<th>Kansas</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 25</td>
<td>475</td>
<td>30</td>
<td>5</td>
<td>80</td>
</tr>
<tr>
<td>August 1</td>
<td>176</td>
<td>134</td>
<td>19</td>
<td>46</td>
</tr>
<tr>
<td>August 8</td>
<td>111</td>
<td>233</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>August 15</td>
<td>28</td>
<td>206</td>
<td>50</td>
<td>26</td>
</tr>
<tr>
<td>August 22</td>
<td>11</td>
<td>181</td>
<td>85</td>
<td>48</td>
</tr>
<tr>
<td>August 29</td>
<td>104</td>
<td>92</td>
<td>48</td>
<td></td>
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<tr>
<td>September 5</td>
<td>91</td>
<td>108</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>September 12</td>
<td>65</td>
<td>93</td>
<td>24</td>
<td></td>
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<tr>
<td>September 19</td>
<td>16</td>
<td>50</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>September 26</td>
<td>11</td>
<td>71</td>
<td>2</td>
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</tbody>
</table>

**Inspection at Shipping Point**

Federal-State shipping point inspection has been available in New Jersey since the inauguration of this type of work in 1922, but not until the past two years has it received any steady recognition of its worth in the potato industry. In the 1926 season 423 cars were inspected at shipping point and last year the number increased to 756 cars, in each case representing a little more than 10 per cent of the state’s carlot movement. Indications are for a continued increase in the voluntary use of this service because its merits are becoming more generally acknowledged by growers and dealers. To them its benefits are principally that it promotes grading and standardization; that it is a strong advertising point and so assists in making sales; and that it assists in forcing acceptance of cars of potatoes which are up to grade or which are sold and confirmed on a mutually agreed basis.

**Conclusion**

The New Jersey potato industry is constantly adopting new measures for the improvement of its business, of which the radical change in variety a few years ago was the first step. The general use of certified seed has represented another stage in advance, for prior to 1921 less than five per cent of the seed potatoes planted in New Jersey were certified, while in 1926, dealers handling 95 per cent of the seed potatoes in Central Jersey reported that over 90 per cent of the seed sold by them was certified, most of which was from Prince Edward Island. The widespread adoption of spraying and better cultural practices, the increasing attention to grading, more effective distribution, and now shipping point inspection—all
these are improvements in the industry. With the efforts of growers, dealers, the State Potato Association, the Potato Improvement Committee and other allied agricultural agencies centered toward one common end, New Jersey has established itself as one of the important potato producers of the nation.

Crop and Market News

Potatoes Marking Time

(Contribution from the Bureau of Agricultural Economics)

The potato market has fluctuated considerably during recent weeks, but was marking time about September 10, awaiting the clearance of mid-season supplies and further possible changes in the crop report. With production in Kansas and Missouri estimated nearly 50% heavier than last year, that region probably will continue shipping until October. Combined output of the two states to September 1 was 4,430 cars, compared with 5,015 the year before, which indicates that a considerable volume was yet to come. New Jersey also has a crop fully equal to that of 1927, but had shipped (by rail) only 2,735 cars by September 1, or about half as many as a year ago. It is the delay in harvesting these mid-western and eastern potatoes,—including Long Island stock,—that is causing some anxiety for northern and western shippers.

Early potatoes in the main-crop states are ready for digging, but most growers are leaving them as long as possible, in the hope of better prices. The Antigo section of Wisconsin reported f. o. b. range of only 75c-80c per 100 pounds during the forepart of September, while Early Ohios were bringing 60c-75c in southeastern Minnesota. Shipments figures show, better than anything else, the delay of the present season. By the opening of this month, 16 of the 19 surplus-producing late-potato states had forwarded only 6,740 cars, as against 11,745 the year before. The only sections, which were running ahead of last season’s corresponding record, were Washington, central and southern California, and Pennsylvania. The most important shipping states are far behind their 1927 totals to date.

Production Estimates Increased

According to August condition, a total potential crop of 460,-000,000 bushels of potatoes is now expected, as against 407,-000,000 last year and the previous high record of 453,000,000 bushels, established in 1922. Michigan, Wisconsin, and Minnesota together expect nearly 103,000,000 bushels, or one-fourth more than in 1927. Of the 53,000,000-bushel increase over last season, about 10,000,000 were in early shipping states. The 16
deficient producing states, several of which are most active shippers during the summer months, have about 15,600,000 bushels of the excess over last year's total. But the 19 important main-crop states, which furnish nearly all of the carlot shipments after September, have but 27,000,000 bushels more or only 10% greater production than in 1927. If the crop this season is carefully graded and if culls and No. 2 potatoes are largely left on the farms, the market position of No. 1 stock may not be so bad, after all. The late crop in eastern states will not be excessive. With a 20% increase over last year, the North Central states appear to have 21,000,000 bushels more than they produced in 1927. The western crop is likely to be below last season's heavy total, but still far above average.

Early-September Markets

Kansas and Missouri sacked Cobblers, many of them dirty, were down to low range of 57c-75c per 100 pounds in the Chicago carlot market, while Minnesota Early Ohios ruled 85c-90c, Nebraska stock 85c-$1, and Wisconsin arrivals about $1. Hauling was rather heavy in the Antigo section of Wisconsin. The Kaw Valley price on Cobblers held about steady around 55c, and potato shipping points in New Jersey reported a range of 95c-$1. Eastern Shore stock strengthened a bit in eastern markets at $2-$2.50 per barrel. These potatoes have been largely crowded off the Chicago market by liberal receipts from territory closer to Chicago. General jobbing range on arrivals from Pennsylvania, New Jersey and Long Island was $1.05-$1.45 per 100 pounds. New Jersey was shipping an average of 125 cars daily, compared with 100 from the Kansas-Missouri territory. Movement from the important northern and western states had increased to an average of 200 cars each day, compared with 400 daily during early September, 1927.

Notes

NEW YORK

The rainfall of the last month has been heavy enough to give heavy and healthy vine growth over the greater part of the east. At the same time, while there are large areas where late blight has gained a start, there are not many places it is yet serious enough to badly reduce yields. One to two weeks of general rainy weather would destroy a large proportion of eastern vines, as the disease is present and needs only more moisture to develop.

Southern New York shows less tip-burn than average season. Stand losses from seed rotting and floods heavier than average, losses from rhizoctonia probably less.
Yield per acre certainly within radius of 100 miles and probably much further will be a weather proposition for the rains of the next six weeks to determine. (August 24).

—DANIEL DEAN, Nichols, N. Y.

MINNESOTA

As a result of a week's tour in the potato sections of Minnesota beginning July 31 and ending August 6, a fairly good idea of the condition of the potato crop was obtained in the localities visited. These included University Farm, St. Paul, Minnesota; Osseo, Anoka; Elk River, Moorhead, Sabin, Dilworth; East Grande Forks and adjacent territory, Crookston, Thief River Ralls, Fosston and Hollandale. Generally speaking the condition of the crop was good and the character of the seed stock being grown was noticeably improved over what had been observed in former visits. There were, of course, as in many other sections, plenty of poor commercial fields. In the Red River Valley, especially in Clay County, poor stands were rather general. This was attributed to having been planted when the soil was hot and dry and to excessive rains later on and low soil temperatures causing a large per centage of the seed pieces to rot.

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If your dealer does not carry them, write us and we will try and serve you. Remember the price is low for a first-class Digger.

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An outstanding example of the slowness of some growers to recognize the value of good seed was observed in Clay county where a potato grower had planted his 400 acre crop with the most nondescript lot of seed imaginable. It contained about all the virus diseases known, besides rhizoctonia, fusarium wilt and blackleg and in addition a goodly percentage of varietal mixtures. It is safe to say that the use of poor seed in this particular instance will result in a direct loss in yield of at least 30,000 bushels of potatoes. The remarkable thing about this particular case is that the man is regarded as a successful potato grower and has never grown less than 360 acres for the past 20 years or more and has kept accurate his account of prices received for his crop. From 1911 to 1926 inclusive his account books shows an average sales price of $1.06 per bushel at shipping point.

The potato crop in the Red River Valley in Polk county was found generally better, particularly as to stand, than in Clay county. To those who have been familiar with potato production in the Valley, the change or shift over from the Early Ohio to the Irish Cobbler and the Triumph is quite noticeable.

In the Hollandale district approximately one-half of the 15,000 acres of peat, muck and mineral soils reclaimed by the Payne Investment Company has been planted with potatoes this season. Heavy rains the last week of July had caused some damage to the potato and celery crop on the less well drained areas. Outside of the damaged portions of some fields the crop was looking fairly good. On account of deterioration in the seed stock planted, there will be a considerable acreage of the 1,500 entered for certification rejected owing to the presence of too high a percentage of disease. Rhizoctonia was unusually severe on the peat and muck soils and there has also been some blackleg.

—WM. STUART.

NORTH DAKOTA

The Soo Line Potato Tour Special

The Soo Line Railway through its Agricultural Department have, in cooperation with the Albert Miller and Company of Chicago, Illinois, undertaken a large seed potato development project in territory contiguous to the railway in North Dakota and Minnesota. So far as we are aware it is the largest project of its kind ever undertaken by any railroad thus far. It has involved a large amount of propaganda work in order to interest farmers to plant a reasonable potato acreage and in addition it has placed upon the railroad representatives the responsibility of finding and supplying the growers with suitable foundation stock of the varieties desired as well as a prospective market outlet for the crop produced. The Albert Mil-
ler and Company have cooperated in furnishing the seed and have entered into a contractual agreement for the purchase of seed stock that passes certification. The grower receives a basic price per bushel at time of delivery of his stock. To this the Albert Miller and Company add a fixed charge for the storing, handling and marketing of the crop. All receipts in excess of these two fixed charges are to be divided equally between the grower and the company. The project also involves an obligation on the part of the Soo Line and the Albert Miller and Company to provide suitable trackside potato warehouses in which the crop can be stored and handled. Six new warehouses are being erected this season. That at Anamoose, N. D. has an outside dimension of 53x104.6 feet with a capacity of 55 carloads in the basement, when stored eight feet in depth, and 25 carloads on the floor above. The wall construction is of hollow tile covered with waterproof cement on the outside below ground. The bins have a floor dimension of 8x12 feet and are provided with ventilated side and end walls and an inverted V-shaped trough extending lengthwise of the center of the floor of the bin to provide further aeration. Ample provision for ventilation of the building is included in the structure.

With this picture of the Soo Line potato development work it will now be possible to present a brief outline of the potato

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**Make Money for Potato Growers**

Eureka Potato Machines take hard work out of potato growing. They reduce time and labor costs. They assure bigger yields.

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  - Cuts uniform seed.
  - Operates with both hands free for feeding.

- **Potato Planter**
  - One man machines doing five operations in one. Over twenty years' success.

- **Traction Sprayer**
  - Insures the crop. Sizes, 4 or 6 rows, 60 to 100 gallon tanks. Many styles of booms.

- **Potato Digger**
  - Famous for getting all the potatoes, separating and standing hard use. With or without engine attachment or tractor attachment.

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**Nitrophoska**—15% Nitrogen (18.2% Ammonia), 30% Available Phosphoric Acid, 15% Potash. A concentrated, complete, chemical fertilizer—not a mixture. Every particle is like every other particle and contains all three plant food elements in available form. You get 60 pounds of actual plant food in every 100 pound bag.

**Urea**—46% Nitrogen (55.9% Ammonia). A very concentrated carrier of nitrogen in pure organic form—the same form in which it is found in liquid manure. In seven years of testing, Urea has given excellent results as a source of nitrogen for potatoes.

**Leunassalpeter**—26% Nitrogen (31.6% Ammonia). A highly concentrated nitrogen carrier containing both nitrate and ammonia nitrogen—\(\frac{3}{4}\) as nitrate, \(\frac{1}{4}\) as ammonia. It is extensively used in fertilizer mixtures for potatoes.

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—"It's Nitrogen from the Air"—
tour itself which is the primary motive for writing this article. On Tuesday afternoon, August 7th, there arrived at Minneapolis, from Chicago, two special pullman cars containing a group of some twenty representatives of potato interests from several states. This group headed by F. R. Newman, vice-president of the Soo Line, and E. P. Miller of the Albert Miller and Company represented the vanguard of a larger group, the members of which had travelled varying distances in order to join the special at Minneapolis or other points along the way. A brief automobile sightseeing trip through the city's numerous recreation parks followed by a banquet at the Minneapolis Athletic Club afforded relaxation to those on the tour prior to their departure for Leal, N. D. which was the first scheduled stop for the inspection of potato fields. Here the party was met by local business men and growers who furnished transportation to the four farms visited during the forenoon of August 8. On the completion of the morning's inspection trip those accompanying the tour boarded the train and during the lunch hour proceeded to Carrington which was the next point to be visited. Here similar accommodations were found awaiting the party as at Leal and in this case five farms were visited during the afternoon. The Irish Cobbler seemed to be the favorite variety grown in both districts visited during the day. Some excellent seed of this variety was observed on the Nicholson Bros. farm near Carrington. Over 1,000 acres are being grown around Carrington this season and it is hoped to increase this acreage to 5,000 or more as the possibilities in seed potato production become more generally appreciated.

A potato warehouse of the same dimensions as that of the one mentioned at Anamoose was under construction. This house is being built by the Carrington Warehouse Company and is especially intended for the storing and handling of seed potatoes. The days tour was completed by an open air evening session held in the park at which those on the tour were tendered an address of welcome by one of Carrington's leading citizens. This was followed by several short talks by visiting members and a few musical selections rendered by an impromptu quartet composed of members of the party. The meeting was ably presided over by E. F. Johnson, general agricultural agent of the Soo Line. During the night the special train with its occupants was moved to Harvey where in the morning the party found automobiles awaiting them in which they were taken to the scheduled farms where opportunity was given to observe the character of the Irish Cobbler, Triumph and Early Ohio strains of seed being grown in that section.

A 75 car capacity warehouse was under construction at Harvey. During the noon hour the train proceeded to Minot where
on arrival the party was escorted by Minot Chamber of Commerce members on an inspection of potato fields in the vicinity of Burlington. The principal feature of interest to most of the party during the afternoon were six plots of potatoes being grown by the Burlington Warehouse Company. These plots embraced Minnesota State Certified Irish Cobbler, North Dakota state certified Early Ohio and Triumph, common Triumph and Early Ohio and Green Mountain table stock. The latter proved of considerable interest on account of varietal mixtures and diseased plants. The stock was said to have come from the Province of Manitoba. It furnished an excellent object lesson of the folly of planting seed stock of unknown origin. This plot of potatoes was not only worthless as a source of seed stock but was a menace, serving as a source of disease contamination to adjoining seed plots.

While the party slept the special train proceeded from Minot to Anamoose where the next morning opportunity was afforded those on the trip to inspect Triumph and Irish Cobbler potato fields. The special feature of the day’s trip was an inspection of some 325 acres of potatoes on the Moorhead farms some six miles from Anamoose. This acreage was largely composed of the Triumph variety. One of the interesting phases of the work on this place were the extensive experimental plots devoted to fertilizer and seed disinfection studies.

The Armour Fertilizer Works through its field representatives and the Agricultural Agent of the Soo Line are actively cooperating in the fertilizer tests while representatives of the Semesan Bell and Dip Dust compounds are also cooperating with the Soo Line agents in the seed disinfection work.

As the writer was obliged to leave the potato tour at Anamoose no attempt will be made to describe the remainder of it.

**Impressions of the Tour**

Our impressions of the tour and the seed potato development project as a whole, aside from those already mentioned may be briefly summarized as follows:

1. One is impressed with the size of the undertaking and the cooperative efforts of the Agricultural Department of the Soo Line to assist the growers in making a right start.

2. The extent of the financial investment of the Albert Miller and Company in the project.

3. The necessity in next season’s work to use only the highest class seed obtainable; a considerable acreage being grown this season will have to be discarded, but some lots are sufficiently good to serve as foundation stock.

4. The future success of the enterprise is largely dependent on the ability of those in charge of the work to develop growers of foundation seed stock and on the strict business integrity of the producers and sellers of the stock.
5. It is impossible to refrain from certain comments regarding the smoothness and freedom from annoyance of any kind with which the whole tour was conducted. Every facility was provided those attending the tour to see everything that it was possible to see, in the time allotted, of the seed potato development project. There were no delays and always enough automobiles available to comfortably accommodate every member of the party. In fact, everything possible was done to make the tour both pleasant and profitable to all concerned throughout the whole trip. Great credit is due the Soo Line and especially to E. F. Johnson and his co-workers for the excellent manner in which every detail of the tour was handled.

Wm. Stuart

NEBRASKA

The annual potato tour in western Nebraska held August 13th to 16th was very well attended by visitors from outside the state and by the local potato growers. The principal items of interest were certification fields, experimental plots of the various departments of the Agricultural College and the increase seed plots from tuber index potatoes. The latter are some 25 in number, conducted in cooperation with the Nebraska Certified Potato Growers Cooperative and the College of Agriculture.

Three types of machines for planting potatoes by the tuber unit method were demonstrated throughout the tour,—the Iron Age, a Baker Automatic and the Keystone with a special attachment developed by two western Nebraska potato growers. While all of these machines can be worked satisfactorily it was generally agreed that the latter machine developed by Messrs. Kutchara and Hoffman of Hay Springs, Nebraska, was easily the most practical and most efficient machine observed. With this machine the potatoes are cut and planted in four hill units and the cutting edges are disinfected after each tuber has been cut. This latter precaution eliminates the objection to automatic cutting machines now on the market, as without such a precaution spindle-tuber and possibly mosaic and the fungous diseases are likely to be spread. The two growers who have invented this contrivance are planning to have it patented and then manufactured for distribution. It will undoubtedly serve a very important place in seed potato production work. They will probably adapt the same device to the Iron Age planter.

Crop conditions during the early portion of the growing season were quite satisfactory with the exception that excessive rains at planting time were apparently responsible for very poor stands. During the latter part of July the dry and hot
weather which has continued almost unbroken for four weeks did considerable damage to the rather large vine growth that was produced by the earlier conditions. At this date the prospects are that the late crop, especially in the dry land regions, will ripen several weeks earlier than normal. It also seems very probable that the yield will not be much more than 50 or 60% of what was in prospect about the middle of July.

The early plantings (April and May) were practically all killed off by early blight during the third week in June. Digging has been delayed in these early fields due to unsatisfactory prices. Many of them will either remain undug or will be put onto the market in competition with late potatoes.

-H. O. Werner.

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Review of Recent Literature

Factors Affecting Returns from Potatoes in Massachusetts

Mighell, Ronald L., Massachusetts Agricultural Experiment Station, Bulletin 240.

Potato production as an economic part of the farming scheme in Massachusetts was studied by using information obtained from 54 farms in four different areas in 1926. Personal visits were made to 13 or 14 farms each in Chesterfield, Granby, Concord, and Seebouk districts. Soil type, rotation, fertilizer, seed, labor distribution, varieties, spraying, and the like were studied in their relation to yield, cost of production per acre and cost of production per bushel.

Massachusetts produces only two to three million bushels annually, or about one-tenth its consumption requirements. The author raises the question whether farmers in the areas adapted to this crop could not afford to increase production. Potato farm prices in this state have averaged 50 to 67 cents a bushel higher than farm prices in Maine during the years 1921 to 1926, largely because of differences in freight and handling charges. Data are presented to show that man labor on these farms ranged from 54 to 216 hours per acre. Rate of seeding varied from nine to 20 bushels and manure from none to 30 tons per acre. Yields varied from 70 to 388 bushels in 1926. The use of special potato machinery reduced the man labor requirement in planting from 17.9 to 7.5 hours and in harvesting from 66.3 to 42.6 hours per acre. In general, the cost of producing an acre of Cobblers was as high as that of Green Mountains. Since the yield of the latter was consistently higher, returns per acre were in favor of the Green Mountains. The
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author concludes that the practice of greater efficiencies in the use of labor, seed, fertilizer and all other factors affecting yield would result in increased profits for those favorably situated for potato production.

—E. V. HARDENBURG.


The author treated seed in solutions of sodium and potassium thiocyanate and thiourea. The varieties Great Scot and President were used in the first experiment and King Edward and Arran Chief in the second trial, while in a third test all but Great Scot were treated. Differences in varietal response to the treatment were noted. It was found that the chemical stimulants used did aid in abridging or abolishing the resting period especially when cores of the potato tubers were treated. The thiourea treatment resulted in the development of more sprouts from a single eye than from the thiocyanate treated seed.

—WM. STUART.


The progeny of several crosses of Solanum utile crossed with domestic varieties of the potato were studied by the author for the purpose of observing the segregation of characters of the two parent plants. The $F_1$ seedlings in all of the crosses, no matter what the domestic parent, were perfectly uniform. On the whole the progeny bore a striking resemblance to $S. utile$. They differed however from $S. utile$ in being considerably taller. They also bore seed balls freely. Some abnormal plants were noted which in outward appearance closely resembled $S. utile$ but which were somewhat taller and bore a small crop of rounded tubers on relatively short stolons. $S. utile$ generally does not produce tubers or at most a small white long tuber which is more like a thickened stolon than a tuber proper. These were propagated from tubers the following year and all three of the abnormal plants mutated in every character to their original $F_1$ sister plants. Back crosses were not effected between the original domestic parent and the $F_1$ seedlings but with two of $F_2$, $S. utile$-like plants and one of the $F_2$ generation Figures 1 and 2 graphically represent the way in which individual seedling progenies segregated as to certain characters.
Cytological studies sowed 36 chromosomes in the heterotype and homotype divisions of *S. utile* while that of a highly bred domestic seedling used as a male parent had the haploid number of 24. In the F₁ generation the somatic number is presumed to give \(2x=60\) and this number is assumed to give the typical uniform F₁ plant. At the reduction division of the F₁, 24 domestic chromosomes unite with 24 *S. utile* chromosomes giving 24 bivalents, the other 12 *S. utile* chromosomes remain unpaired and segregate at random in the heterotype and homotype divisions so that the composition of the pollen grains varies from 26 to 32. On the assumption that the same type of segregation occurs in the megaspore, mating of gametes would give a variety of forms possessing 24 bivalents plus a varying number of univalents. Chance mating of gametes, it is suggested, will give two types of chromosome complex in the F₂: (1) Those containing 60 to 72, that is plants derived from gametes containing six or more univalents and (2) those containing from 48 to 60, that is derived from gametes containing less than six univalents.

-WM. STUART.

**Salaman, Dr. R. N.—The Inheritance of Cropping in the Potato.** Souderadruck aus den Verhandlungen des V. Internationalen Kongress fur Vererbungivissenschaft Berlin 1927 p. 1240-1253.

According to the author the investigations were begun in 1911 and deal with some 25,000 seedling potatoes embraced in over 400 families. The following system was adopted as a means of more accurate measurement of the relative cropping inheritance in different seedling families.

Crop 1 in which the proportion of the tuber mass to the above ground hauhn is very high. Such crops would be designated as very good.

Crop 2 in which the proportion is less and in which the crop would be described as fair or medium.

Crop 3 in which the proportion is still less and the crop, though not an indifferent one, is in no sense negligible would be described as poor.

Crop 4 where the proportion sinks still further and the crop, almost negligible, would be described as extremely poor.

Crop 5 where there is no tuber formation, or at most a few thickened bulbous swellings on the stolons. Such plants would be designated as zero croppers. The article contains 24 figures representing the cropping curves of many families. In a discussion of the relation of vigor to crop the author states that whilst the relation between actual crop weights and the vigor of
the plants producing them is a close one, there is no definite relation between the cropping curve of a family and the vigor of the plants which give rise to it. A high curve may be associated with a low or high vigor and a low one with a high or low vigor. On the other hand zero croppers were frequently found to be accompanied by the highest vigor.

—WM. STUART.

Dudley, Jr., John E. and C. L. Fluke, Jr. Spraying versus Dusting to Control the Potato Leafhopper in Commercial Potato Fields in Wisconsin.


The experiments reported in this bulletin extended over a period of four years—1922 to 1925—and were conducted at Waupaca and Spooner, Wis. A triple pump traction sprayer covering four rows with three nozzles to the row was used to apply the liquid Bordeaux sprays at both points. An engine driven four-row duster was used at Spooner and a four row traction duster at Waupaca, each machine being equipped with two nozzles to the row. Five varieties were included in the test viz. Triumph, Green Mountain and Early Ohio one year, King three years and Rural New Yorker four years. The formula used in making the liquid Bordeaux mixture was four pounds copper sulphate; five pounds hydrated lime and 50 gallons of water. The copper-lime dust contained either 20 or 25 per cent monohydrated copper sulphate according to whether or not an arsenical was used. A definite increase in the percentage of No. 1 potatoes was secured both by spraying and dusting. The average increase of No. 1 potatoes in the treated plots was 6.1 per cent greater than in the check plots, which equals 8.4 bushels per acre. The average increases for spraying and dusting combined varied from 22.7 bushels per acre in the two years of little hopperburn to 59.3 bushels per acre in the two years of heavy hopperburn.

The average yields from all sprayed dusted and check plots were as follows:

All sprayed plots—167.9 bushels per acre.
All dusted plots—163.1 bushels per acre.
All check plots—136.4 bushels per acre.

The cost of spraying and dusting four times was $11.26 and $11.97 respectively per acre.

—WM. STUART.
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WHY WE SHOULD EAT MORE POTATOES

Since Count Rumford, a New England Yankee, soon after the close of the American Revolution taught the people of Bavaria to make potato soup, the potato has steadily grown in popularity in central European countries. During the Great War, the potato rendered the same service to Germany that corn did to this country. The per capita production of potatoes in Germany before the War was 24 bushels, whereas in this country we produce for each inhabitant scarcely four bushels per annum.

In this country we have not yet begun to appreciate the value of the potato as an article of food. The Americans are essentially grain eaters. There are many reasons for this. The potato requires intensive cultivation and much hand labor, whereas cereals can be readily produced in enormous quantities by the use of machinery alone. Cereals, particularly corn, wheat and oats, have been extensively exploited by great manufacturing companies, and the American people through the medium of magazine and newspaper advertising have been educated in the use of cereals to such an extent that ready-to-eat foods prepared from wheat or corn have become the conventional staples of the American breakfast and fill a large share of the space on grocers' shelves.

These breakfast foods have performed a most useful service for the American people by lessening the consumption of butcher's meat and replacing to a large extent the indigestible fried dishes of various sorts which formerly constituted the American breakfast, and have no doubt been a factor in the marked lowering of the American death rate.
which has occurred within the last few years. Nevertheless it must be admitted that while bread has for ages enjoyed its deserved reputation as the staff of life, it is not altogether commendable as a chief source of human nourishment. The profound studies of our nutrient needs which have been made in recent times by numerous eminent investigators have shown that cereals possess certain characteristic qualities which render their too free use not only undesirable but a possible source of serious systemic injury.

More than 30 years ago the eminent Swiss bio-chemist, Professor Bunge, called attention to the fact that because of the great excess of phosphoric acid in cereals their free use tends to lessen the normal alkalinity of the blood and tissue fluids, thus working great injury, for nothing is more important for good nutrition, resistance to disease, high efficiency, endurance and longevity than the maintenance of a high standard of blood alkalinity. When the alkalinity is lowered by the overaccumulation of acids in the blood and tissue fluids, there is increased susceptibility to colds, to influenza and to such maladies as pneumonia and other grave acute diseases. The chances of recovery from an attack of infectious disease such as typhoid fever or influenza is greatly lessened when the blood alkalinity is lowered. The chief reason for this is that the blood is our chief defense against the attacks of germs which give rise to infectious diseases. When the blood is invaded by these enemies of life and health, certain of the blood cells, known as leukocytes, attack the bacteria and if successful, destroy them. The fighting ability of the blood cells in their defensive battle depends upon the state of the blood. When it is normally alkaline the leukocytes are highly active and pursue and destroy the invading bacteria with great vigor, but when the alkalinity of the blood is lowered by an excessive intake of unoxidizable acids such as the phosphoric acids found in great excess in wheat, corn and other cereals, the fighting power of the
blood cells is diminished.

It is now believed by many eminent investigators that an excess of acids circulating in the blood tends to cause premature hardening of the arteries, or arteriosclerosis, and in this way encourages the development of Bright's disease and other degenerative maladies.

Although the preponderance of acids in cereals was pointed out many years ago by Bunge and other authorities, it is only within the last few years that their importance has come to be appreciated by students of human dietetics. This has led to an exhaustive study of foodstuffs with special reference to their alkaline and acid properties.

The character of a food is shown by its ash. Food is body fuel and when burned in the body leaves a residue or ash the same as when burned in the ordinary way. The acids and bases, or alkalies which compose this residue, are chiefly eliminated by the kidneys. When the ash contains a preponderance of acids, as in the case of cereals, the effect of the food is to lessen alkalinity. On the other hand, when bases, or alkalies, predominate in the ash, the effect of the food is to increase alkalinity and in so doing to increase resistance to disease and endurance.

The ash of the potato is more highly alkaline than that of any other of our common foodstuffs, its ash containing about ten times as much potash as does that of fine flour bread. This fact gives to the potato great importance as a dietetic means of maintaining the alkalinity of the blood and tissue fluids, which modern science has shown to be so important that a loss of alkalinity so great as the difference between ordinary pipe water and distilled water, will cause instant death.

It is not to be understood, of course, that cereal foods should be altogether avoided as unwholesome. They become injurious only when too freely used and made to constitute the major part of the
diet, and especially when used in conjunction with meats or eggs. It is only necessary to bear in mind that cereals of all sorts are acidifying foods and to combine with them other foods in which the alkalies predominate. Alkalies are found in large excess in the ash of fruits and vegetables of all sorts, but the potato is particularly rich in alkaline elements and hence is perhaps better suited than any other foodstuffs for neutralizing the excessive acidiity of cereals. Milk is a neutral substance; hence the oatmeal, milk and potato diet of the Irishman is a well balanced physiologic dietary, and it is doubtless to this fact that the Irish owe their great vitality and endurance and, particularly, their wonderful longevity, which exceeds that of any other European nation, with the exception of the natives of Bulgaria, whose diet is very similar.

A bread and meat dietary, however, as has been frequently pointed out by McCollum, and, as the writer has maintained for more than half a century, is not wholesome. Bread supplies acids in excess, and steaks, chops and meats of all sorts, contain a still greater excess of acids. Many cases of Bright's disease give a history of liberal meat consumption and scanty use of vegetables and fruits, and thousands of doctors are daily saying to their patients, "Cut out meats." Scientific and up-to-date doctors are beginning to add to the instruction to avoid meats, "Eat more potatoes."

Another unphysiologic combination is the common breakfast dish, poached egg on toast. Both eggs and bread are highly acid foods and their use tends to surcharge the blood and tissues with acids, and to burden the kidneys with superfluous work, since one important function of these organs is to maintain the alkalinity of the blood at a proper level by removing any excess of acids.

Substituting the potato for bread, we have in the alkaline tuber and eggs, an entirely wholesome combination, since the alkalinity of the
of the potato will balance and neutralize the acidity of the egg. For a complete balance, one small potato is required for each egg. From the standpoint of palatability, the egg-potato combination is entirely satisfactory.

The effect of a diet upon the alkalinity of the body fluids, is readily shown by the urine. Acid foods increase the acidity of the urine, while alkaline foods lower the acidity. The acidity of the urine is thus an indicator of the effect of a diet upon the tissue fluids. The urine of persons who subsist largely upon cereals and meat or eggs, is always highly acid. Not infrequently the urine of such a person will be found to be fifty times as acid as it ought to be or even a hundred times more acid than normal.

The labor of eliminatine this enormous excess of acid wears the kidney out prematurely and undoubtedly shortens life, and greatly lessens efficiency. The writer has no doubt that this is one of the great causes of the steadily lessening maximum longevity in this country. Centenarians are rapidly disappearing. Potato-eating Ireland furnishes more examples of great longevity than any other European country except Hungary.

The writer has for many years advocated very strongly an increased consumption of potatoes, replacing a part of the bread and other cereals which now enter so largely into the American bill of fare. The effort that is being made by the Potato Association of America to promote the cultivation of this wonderful tuber, is highly commendable and will undoubtedly result in greatly improving the health and efficiency of the American people.
ALCOTT's "POTATO GOSPEL"

When Carlyle, the famous English essayist, ridiculed Bronson Alcott's "damned potato gospel," he helped to block the wheels of a dietetic progress which would have meant far more for England's prosperity than the discovery of gold in the Transvaal or the founding of a new colony. Alcott was right. The potato has made good. It is proving itself to be one of the choicest of all America's gifts to the world. If corn is king of cereals, the potato is certainly queen of vegetables; and there is good reason for believing that the country would be much better off economically as well as from the standpoint of health, if this wonderful tuber, one of nature's most amazingly efficient devices for capturing and storing solar energy, occupied a much more conspicuous place in our American dietaries.

For some unaccountable reason, the potato has always been opposed by absurd and wholly baseless prejudices. When first introduced into Europe, the potato met great opposition. It was even accused of being the cause of leprosy, which was then more or less prevalent in various European countries. In more recent years, the potato has been charged with being the cause of indigestion and rheumatism. All of these accusations are equally unfounded.

The idea that root vegetables, particularly roots such as the potato, are inferior foodstuffs and indigestible, is a serious error which somehow has attained wide currency. The fact is that root starches when cooked are by far the most easily digestible of all foodstuffs.

Some years ago, Professor Grierson, an eminent German physiologist, made a careful study of the digestibility of starches from various sources. He found that the starch of rice, wheat and corn requires two hours for digestion; the starch of oatmeal, eighty minutes; while arrowroot digests in thirty
minutes and potato starch is completely digested in ten minutes. In other words, the starch of wheat, corn and rice requires twelve times as long for digestion as does the starch of potatoes; and the starch of oatmeal, eight times as long.

No doubt the substitution of cereal breakfast foods for the oldtime griddle cakes, fried potatoes, fried pork and other indigestibles, has been in the interest of the conservation of the American stomach, but there is much reason to believe that the Irish potato, steamed or baked, might well fill a larger place in the national bill of fare, especially as a breakfast food.

A baked potato digests in much less than half the time required for the digestion of a slice of bread and affords nutritive substances in some respects superior to those provided by wheat.

The above mentioned results were fully confirmed by tests made in the laboratory of the Battle Creek Sanitarium by an expert German chemist. So it appears that the potato, far from being hard of digestion, is one of the most easily digestible of all foods. If it seems at any time to disagree, the cause will generally be found in the mode of cooking or in indigestible combinations. Frying greatly lessens the digestibility of the potato; but on the whole, it is less easily spoiled by ignorant or careless cooks than are most other foodstuffs.

When Sir Walter Raleigh sent his first cargo of potatoes to England nearly 350 years ago (1586), Europe was frequently suffering from the great and frequent prevalence of scurvy. After the potato had come into general use, this great scourge of the Middle Ages almost disappeared.

The housewife adds potato to her bread sponge because it encourages the growth of the yeast plant and so makes the bread rise better. The growth-promoting vitamin B which the potato supplies in great abundance, is as active in encouraging the growth of the children as in helping bread to rise. It is equally useful to adults in maintaining good nutrition and in promoting the
repair of the tissues.

A research undertaken by Ross and Cooper of Columbia University, showed the potato to possess a high nutritive value, and fully capable of meeting the protein requirements of the body when taken in the quantity of about three pounds daily by a person weighing one hundred and ten pounds. The only other articles of food eaten were butter and sugar, the latter in very small quantities.

The observations of Ross and Cooper have been recently confirmed by studies of Kon and Klein, of Warsaw, Poland, whose subjects, two adults, lived for five and a half months on a diet of potatoes, with fat, and a small allowance of fruits. The subjects remained in excellent health, with good digestion and every evidence of good nutrition.

Dr. Hindhede, the eminent Danish physiologist, observed a subject, the Danish athlete, Frederick Madsen, while on an exclusive diet of potato and margarine during eleven months. He remained in excellent health and suffered no serious inconvenience from his diet. Of course, its monotony was not altogether pleasant; but, as Dr. Hindhede says, "Madsen is a hero," and one result of his experiment was to convince the Danish people of the high value of the potato as a foodstuff and to induce them to eat it themselves instead of feeding to pigs and eating it at second hand. The result was a most notable improvement in the mortality rate. The death rate during the period of rationing at the time of the World War, fell more than one-third, reaching the low level of 10.4 per thousand, the lowest death rate ever attained in any country.

As a transformer of sunlight into human food, the potato stands high in the list of food plants; an acre of ground planted to potatoes may be made to produce two or three times as much nutrient material as is ordinarily produced by oats, barley or wheat. Under some circumstances, it may even yield a larger return than corn, its only rival among food-stuffs generally cultivated in this country.
The chief defect of the potato as a complete nutriment, is its lack of lime. It is also deficient in vitamin A. Both these defects are supplied by dairy products. The Irish combination of potatoes and buttermilk is almost ideal. With the addition of greens, nothing is lacking, and on such a diet a man would be as healthy and enduring as his forest relatives, the gorilla and the chimpanzee. Old Parr, who lies buried in Westminster Abbey, lived on this simple fare, with rye bread, for more than a century and a half. His tablet reads, "Here lies Old Parr, who died at the age of 152 years and nine months."

More potatoes, greens and milk, and less meat and cereals, is the diet formula which up-to-date scientific research in nutrition laboratories prescribes for Americans who wish to live long and well.
THE AMERICAN POTATO MIGHT HAVE WON THE MARATHON

Potatoes can run faster than beefsteaks. More than a year ago, Mr. Grantland Rice predicted that American runners would make a poor showing in the next Olympic in long distances. Mr. Rice's prediction was verified by recent events at Amsterdam, but his explanation was incorrect. American runners are not inferior in "human fiber." The Arab, El Ouafi, who won the Marathon, is described as a "thin, undersized youngster," with a "narrow chest and spindling shanks," but he had endurance. American athletes did not lack physique; they lacked endurance. They might have won if they had eaten more potatoes and less beefsteak.

A man who can run half a mile in less than two minutes has leg, lung and heart power sufficient to carry him on several miles in record time or less. If he fails, it is not because of fault in his running mechanism. His lack of endurance, in other words, is not due to lack of sturdy muscles. The explanation is to be found in one single word - acidosis. It is not lack of leg, lung or heart power that stops the long distance runner; it is the accumulation of lactic acid in his tissue fluids. To possess great endurance, one must be able to keep his blood and tissues free from acids. This ability may without doubt be somewhat improved by training, perhaps very considerably; but, after all, endurance is largely a matter of diet.

The reason for this is simple: Every time a muscle contracts, lactic acid is produced and must be neutralized or removed before the muscle can contract again. The blood is made alkaline to make the quick disposal of the acid possible. How essential this is will appear when it
is noted that a sprinter may produce nearly a half pint of lactic acid in one minute. All this acid must be taken care of by the body. It must be oxidized, eliminated by the kidneys or reconverted into glycogen to be used again. Under ordinary conditions, these processes take place so rapidly that the alkalinity of the blood, as essential condition, is well maintained with a small reserve to insure safety. When acid is produced with great rapidity, as in running, the alkali reserve is soon lowered, the oxygen stored in the tissues is consumed, and acids begin to accumulate in the blood. The result is breathlessness and a slowing of muscle movements. It is for this reason that the sprinter’s pace begins to lessen after the first ten or twelve seconds. The acid products accumulating in the muscles interfere with their action, and as these toxic products increase, the muscles become less and less efficient. This is true no matter how strong the muscle may be or how well trained.

The thing that stops the long distance runner is not the failure of his muscles, but the accumulation of acids. It is evident, then, that a man who has a large alkali reserve will have in running a great advantage over the man whose alkali reserve is small; that is, whose blood and tissue fluids at the beginning of his effort already contain an abnormal amount of acid.

Food is fuel. When burned in the body, food leaves residues similar in character to the ashes which are left when the food is burned in a crucible. Some foods leave an acid ash; others, an accumulation of alkaline or basic ash. Such foods as meats and eggs, when burned, leave ashes in which there is a great excess of acid phosphorus, sulphur, chlorine. In other
foods, including nearly all vegetable foodstuffs, with the exception of cereals, the alkalies, potash, soda, lime and magnesia, are in excess.

As a source of food alkalies, the potato heads the list of farinaceous foods. Cereals, the only rivals of the potato as sources of starch, are all acid-formers. This is true even of corn meal, the least acid of all grain products. The alkalinity of the potato is so great that one ounce of potato flour is capable of balancing, or neutralizing, four ounces of fine wheat flour and as ordinarily eaten, an ounce of potato will balance an ounce of bread.

To be able to send to the Olympic games the world's best athletes would mean much more to America than mere athletic prestige. The superior stamina and endurance which result from scientific feeding are the fundamental factors which more than any other promote physical efficiency, resistance to disease and useful longevity.

The so-called "campaign of education" which the packers are conducting to save their declining industry by inducing the American people to eat more meat, demands a counter campaign inspired solely by an interest in the public welfare, the aim of which should be to lessen the use of meat and to increase the use of the potato, together with other fresh vegetables, particularly carrots, spinach and other greens and dairy products. This is the dietetic teaching which the American people need more than any other.