

Dietetic Value of Vegetables.

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Dietetic value in Disease:

In general.

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Constipation.

Dietetic value and composition of different vegetables.

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Pulses.

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Potato, Onion and Radish.

Green vegetables.

Tomato, celery, Lettuce, Rhubarb and Asparagus.

Introduction.

As civilization advances, and the composition, and cookery of vegetables are known, there is a larger amount of them used in our daily food. The potato, now so widely used, and forming a part of our daily diet, was entirely unknown in the eastern continent previous to the discovery of America. The same is true of many of the other common vegetables. The vegetables contain all the proximate food principles that are found in the animal foods. Potatoes are rich in carbohydrates, beans in nitrogenous matter, and nuts in fats. They are important foods on account of being the chief source of the starches and sugars, and also of being a much cheaper food than animal food. Though they are not as highly flavoured as many of the animal

foods, they have an advantage of not being liable to undergo putrefaction, and of seldom, if ever, producing disease. In large cities where fresh vegetables are scarce, there is a tendency for the laborers to use stimulants, and also the same among Chinese who use an abundance of tea. The sources of vegetable food are manifold; almost every part of plants furnish foods, though more especially the seeds, roots, and stems.

Classes.

Plants which furnish their seeds as food, belong to the two great divisions - cereals and pulses. Hutchinson classes the vegetable foods in the following way:

Cereals eg: wheat, oats, etc.

Pulses eg: beans, peas, and lentils.

Roots and Tubers eg: potatoes, onions, etc.

Green vegetables eg: asparagus, cabbage, etc.

Fruits and Nuts eg: Apple - Walnut. etc.

Fungi and Algae eg: Mushrooms, Irish Moss.

However we will only treat of vegetables found in the first four groups.

Chemical Composition.

The characteristic of vegetable food is its richness in carbohydrate, or heat and energy producing principle. The sugar is found in a soluble form throughout the plant. The starch is composed of minute grains formed into layers. By experiment we know that the starch in vegetables is not at all dissolved by cold water. It is only by boiling water that the starch grains are broken, and soluble starch formed. For man, raw starch is almost useless material. In almost all of the vegetable foods the starch is contained in numerous divisions, commonly called cells. The walls of these cells, and their general structure, are

composed of a substance known as cellulose. The cellulose is a form of carbohydrate, but it is characterized by its insolubility. Water either cold or hot will not have any effect upon it. The knowledge of the presence of this substance in almost all vegetables, is of great importance, for when we consider how the starch grains are surrounded by it, and its insolubility, it is evident that this cellulose must present a resistance to the penetration of the nutritive substances by the digestive juices. The proteids in the vegetable foods contain more nitrogen and less of carbon, than the proteids of the animal foods. These proteids easily dissolve in water containing a little salt. The proteids of both the kingdoms have a similar composition, and serve the same purpose in the body, and act in a like

manner in the presence of heat or bacteria.

The fats much resemble those of the animal kingdom, though as a rule, they contain more of the oily constituents, and less of the solid material than do the animal, and produce fatty acids more slowly, thus remaining in good condition longer.

There is a very large amount of water present in vegetables. The vegetables which are the richest in solid constituents, contain seventy eight percent of water, while many of the green vegetables, as the tomato and asparagus, contain over ninety percent. On account of this large percent of water, a large amount of vegetable food must be taken in order to gain enough nutriment. This large bulk of food often proves advantageous.

Many of the vegetables are rich in the mineral salts, — the potato contains

nine tenths percent mineral matter, lettuce one percent, and asparagus contains nine tenths percent. It is necessary that the salts be supplied in our food as the different minerals are found in all of the different tissues. We know that the salt of lime is essential to the body as there is no tissue which does not contain it. Wheat contains one and nine tenths mineral matter, of which a large percent is lime. Phosphates of potassium and sodium are important as the alkaline reaction of the blood plasma, is partly due to them; these are found in the potato.

Digestibility.

On account of the large amount of starch that vegetables contain, they are not much acted on by the digestive secretions until reaching the intestines.

As a rule, vegetable foods are less easily digested and absorbed, than the animal foods, though this depends upon the kinds of vegetable material. If the quantity is small, finely divided, and there is not much cellulose, there will be complete digestion and absorption. As in the case of bread, which is mainly a vegetable food, there is almost complete digestion and absorption.

Cookery.

In cooking vegetables the main objects to be gained is the softening and rupturing of the cellulose framework, and the gelatinization of the starch grains. When starch grains are exposed to heat and moisture, they burst and form a paste or jelly. As this jelly expands it presses on, and finally bursts the framework of the cellulose in which

the germs are enclosed. It is evident from the two above points that cooking is of great importance in rendering them digestible. The more cellulose there is, the more necessary is thorough cooking. The proteids of vegetables are coagulated by heat, the same as are the meats. If a vegetable only contained proteids, the digestibility would be effected like the meats, that is would be rendered more difficult of digestion by long cooking. But there is scarcely any vegetable food that does not contain a large percent of starch, so that the general rule of thorough cooking increases the digestibility of vegetables.

When cooking vegetables great care must be taken that the mineral salts are not dissolved out. When both proteids and starches are present, perfect cooking may be attained by long cooking at low

temperature; while starch grains rupture most readily at 212° F.; they will rupture at a much lower temperature if heat is long continued.

Dietetic value in disease.

The salts - lactates, tartrates, acetates, and citrates become changed into carbonates within the body, and produce in the system that alkalinity which appears to be necessary. A state of mal-nutrition, when developed in its highest form, we call scurvy, always exists when there is an absence of these salts in the foods.

Organic acids are united with a number of the bases that are in the mineral ingredients, and when these acids are used up within the body, alkaline salts are produced. In the potato much of the potash is united with the citric acid.

Sodium carbonate, and bicarbonate are

found in the blood plasma; these are ingested in small quantities by vegetable food, and are also formed in the body from the decomposition of the salts of the vegetable acids. These serve a useful purpose in the blood by carrying the carbonic acid from the tissues to the lungs. The vegetable acids, when changed into alkaline salts, act as preventives of scurvy.

The common disease, gout, may be chemically defined "as a disturbance of the nitrogenous equilibrium by the retention or accumulation of uric acid, which under a sudden excess of becomes precipitated as urates in the different tissues". With the presence of fats or carbohydrates in the food, the proteid metabolism is checked, and a nitrogenous equilibrium is established with a less amount of proteid food. One of the effects of animal food, is to provoke a condition of acidity of the urine, when the use of

vegetables render it alkaline. The ordinary reaction of human urine is acid, and it is customary to call this the normal reaction, because it is that which is usually the case of those that feed on a mixed diet. But the reaction becomes neutral or alkaline when animal food is not eaten, and with the acidity disappear also the concretions. The potash of the salts existing with the organic acids, is separated from the acids by organic combination, and is thus presented to the lithic acid of the blood and tissues, the strong particles of which it converts into soluble lithate of potash, and thus enables them to be carried out of the system. Uric acid in excess produces such diseases as gout and rheumatism. This uric acid results from the imperfect combustion of the nitrogenous matters, for these being incompletely oxidized, form uric acid instead of the urea which would be normally produced. The excess of nitrogenous food cause

not only an abnormal production of the poisonous alkaloids, but it accumulates in the blood and interferes with the oxidation, and the liver, kidneys, and other excretory organs are overtaxed in their work of eliminating waste substances.

In cases of constipation vegetable foods prove beneficial on account of producing peristaltic action. All the foods that are rich in cellulose produce peristalsis by their mechanical action. Foods useful to produce this action would be oatmeal, green vegetables, and whole-meal bread. Peristalsis is also produced by chemical action, and this is brought about by the organic acids in the food.

Dietetic value and composition of cereals.

The cereals are really grasses, which by special cultivation have developed a large amount of food material. They have been cultivated from remote antiquity. They rank first in importance amongst vegetable alimentary principles.

They are plentifully yielded, and of easy digestion as the cellulose is not abundant except in outer covering. They have high nutritive value. The cereals are rich in nitrogenous substances, also in starch, and contain small and varying amounts of gum sugar and fat. They contain a considerable proportion of mineral substances chiefly in the form of phosphates of lime, magnesium, potash and sodium with smaller amounts of iron and silica.

Wheat is the main cereal, as it is the one that the common bread is made of. It is nutritious and is easily digested. There is a substance found in the grain called crealin which is a form of diastase which helps to render the starch self-digestive.

Composition of wheat.

Water	12	Carbohydrate	71.2
Proteid	11	Cellulose	2.2
Fat	1.7	Mineral	1.9

Oats are regarded as being more nutritious than the other cereals. They contain a large percentage of iron and nitrogen. By experiments, oats have been found to contain a particular excitant principle. This power of being a strengthening and an excitant food renders oatmeal a suitable food for the dietary of children.

Composition of Oats.

Water	6.9	Carbohydrate	68.6
Protein	13	Cellulose	1.3
Fat	8.1	Mineral	2.1

For invalids, especially those suffering from gastric catarrh or other stomach troubles, no more nourishing food can be given than oatmeal jelly.

Rice is a cereal that is rich in starch but rather poor in fat and proteids. The starch is present in small and easily digested grains. Rice is absorbed with great completeness in the

intestines. Practically none of the starch is lost. It is a food that leaves only a small residue in the intestines, and thus is an important food in certain cases of disease. As it contains easily digested starch grains, it is found a useful food in disordered states of the digestive tract. In persons suffering from diarrhoea or dysentery, it agrees better than any other solid food, as it produces no laxative action.

Composition of Rice.

Water	12	Carbohydrate	76.8
Protein	7.2	cellulose	1.
Fat	2.	Mineral	1.

Barley is considered as a nutritious food being rich in nitrogenous substances. Especially is it rich in iron and phosphoric acid. Barley water is one of the main diets in many sick rooms, though it does not contain much nutriment, it is used for its demulcent properties. In almost all diseases nourishing

gruels are made from the cereals.

Composition of Barley.

Water	12.3	Carbohydrate	69.5
Proteid	10.1	Cellulose	3.8
Fat	1.9	Mineral.	2.4

Corn is a nutritive grain for it contains a large proportion of fatty matter. Fresh sweet corn is a valuable food; it contains a small amount of marginic acid, and also a valuable amount of nutriment. When fresh it does not disagree with anyone.

Composition of corn.

Water	12.5	Carbohydrate	68.9
Proteid	9.7	Cellulose	2.
Fat.	5.4	Mineral.	1.5

Pulses.

The great group of vegetables known as pulses, of which beans, peas, and lentils are the chief foods, are valuable for the amount of nitrogen they contain. They serve as a great

source of protein food. Some of the pulses, as the beans, are rich in sulphur, and they all contain potash and lime. They contain more lime than any other vegetable food. The pulses are not readily digested by the stomach on account of their bulkiness when cooked. Though if they are properly cooked they will be almost completely absorbed in the intestines.

Roots and Tubers.

The chief food principle, found in this class of foods, is the carbohydrate. Protein and fat are scarcely represented at all. But they do contain mineral ingredients, mainly as salts of potash. These salts form their chief value. These should be cooked carefully as their mineral salts are likely to be lost. They should be cooked by means of steam as far as possible.

The potato is a very common and

useful food.

Composition of potato.

Water	75.77	Starch	20.56
Nitrogenous Matter	1.79	Cellulose	.75
Fat	1.6	Ash	.97

Of the total amount of nitrogen only 49% is proteid; the rest is ammonia compounds and salts. The starch grain is especially large and is easily attacked by ferments. Within and surrounding the cells is a fluid, the albuminous constituents of which are coagulated during cooking. The watery part of this juice is absorbed by the starch granules, which swell up and enlarge the cells in which they are contained. Unless the potato is properly cooked, the fluid referred to is only partially absorbed, and the cells do not become sufficiently distended. In this condition it is not digested and would not furnish to the system the anti-scorbutic principle. Asparagin is one of the

chief forms of nitrogen. It is believed that this substance limits putrefaction in the stomach, and thus spares the proteids. The potato juice has a faintly acid reaction, this is caused by the citric acid. It is combined with salts of potassium, calcium, and sodium which causes it to have value as an antiscorbutic.

The onion is a valuable vegetable, being rich in alkaline elements.

Composition of onion.

Water	85.99	Sugar	2.78
Nitrogenous Matter	1.86	Other extractives	8.84
Fat	.1	Cellulose	.71

The onion has a laxative power which is believed to be due to its cellulose. It is a good vegetable to use in cases of nervous diseases.

There is no vegetable that will relieve and tone up a wornout system, better than the onion. It is used for coughs and colds.

The onion is used as a blood purifier, as it stimulates all the secretions.

Radishes when young are used in salads for the sake of their acid, and for their antiscorbutic property. They have a stimulating effect upon the urinary organs, and act as demulcents. They are often given in cases of catarrh of stomach and bladder; but they prove difficult of digestion for many people.

Composition of Radishes.

Water	90.8	Carbohydrate	4.6
Nitrogenous matter	1.4	Mineral	.7
Fat	.1	Cellulose	3.
Extractives	1.		

Green Vegetables.

Green vegetables are valued mainly for their antiscorbutic salts, and their flavor. The large proportion of cellulose among the solids makes them indigestible, but also useful as laxatives.

The tomato is a beneficial vegetable. It has a refreshing taste, and contains much malic acid which is beneficial to the system.

The tomato produces laxative effects, and is very easily digested. The oxalic acid which it contains makes it injurious to use in cases of gout, or any disease where there is an abundance of uric acid. Tomatoes contain a small percent of calomel, and thus would be of benefit in conditions of the system in which the use of calomel is indicated.

Nitrogenous matter 1.3 Carbohydrate 3.

Water 91.9 Mineral .7

Fat .2 Cellulose 1.1

Celery is a vegetable that is useful in nervous diseases. When cooked it proves to be a very easily digested vegetable.

Composition of celery.

Water 94.6 Fat .7 Cellulose 1.1

N. matter .7 Carbohydrate 2.3 Mineral .6

Lettuce is a salad vegetable. The salads are useful, as none of the salts of the vegetable are lost. Lettuce is refreshing and cooling to the system. The juice of lettuce has a mild narcotic effect, similar to that of opium. It is easily digested and has laxative and antiscorbutic properties.

Water	94.1	Carbohydrate	2.6
N. matter	1.4	Mineral	1.
Fat	.4	Cellulose	.5

Rhubarb is an excellent vegetable. If thoroughly cooked, it is soft and digestible. It has laxative properties. Rhubarb must be avoided in gout and rheumatism on account of the oxalic acid it contains. Rhubarb, by the reason of the tannin it contains, has astringent power. It is a wholesome vegetable, and has not received attention due it.

Composition of Rhubarb.

Water	94.6	Carbohydrate	2.3
Nitrogenous matter	.7	Cellulose	1.1
Fat	.7	Mineral	.6

Asparagus is one of the green vegetables that has only slight nutritive value, but it contains a crystalline nitrogenous substance called asparagin, which produces marked physiological effects. It is sometimes used as a cardiac sedative, though it is best known as a diuretic. On this latter account, asparagus is often used as a solvent for urinary calculi.

Composition of Asparagus.

Water	91.7	Carbohydrate	2.9
Nitrogenous matter	2.2	Mineral	.9
Fat	.2	Cellulose	2.1

Thus we see the hygienic and dietetic value of vegetables. From the economical standpoint they are the cheapest source of foods, not only of carbohydrates, but also of fats and proteids. But their main value is the dietetic

value of their salts and acids, which act as a protection to the system against many common ailments.

Authorities.

Hutchinson - Food and Dietetics.

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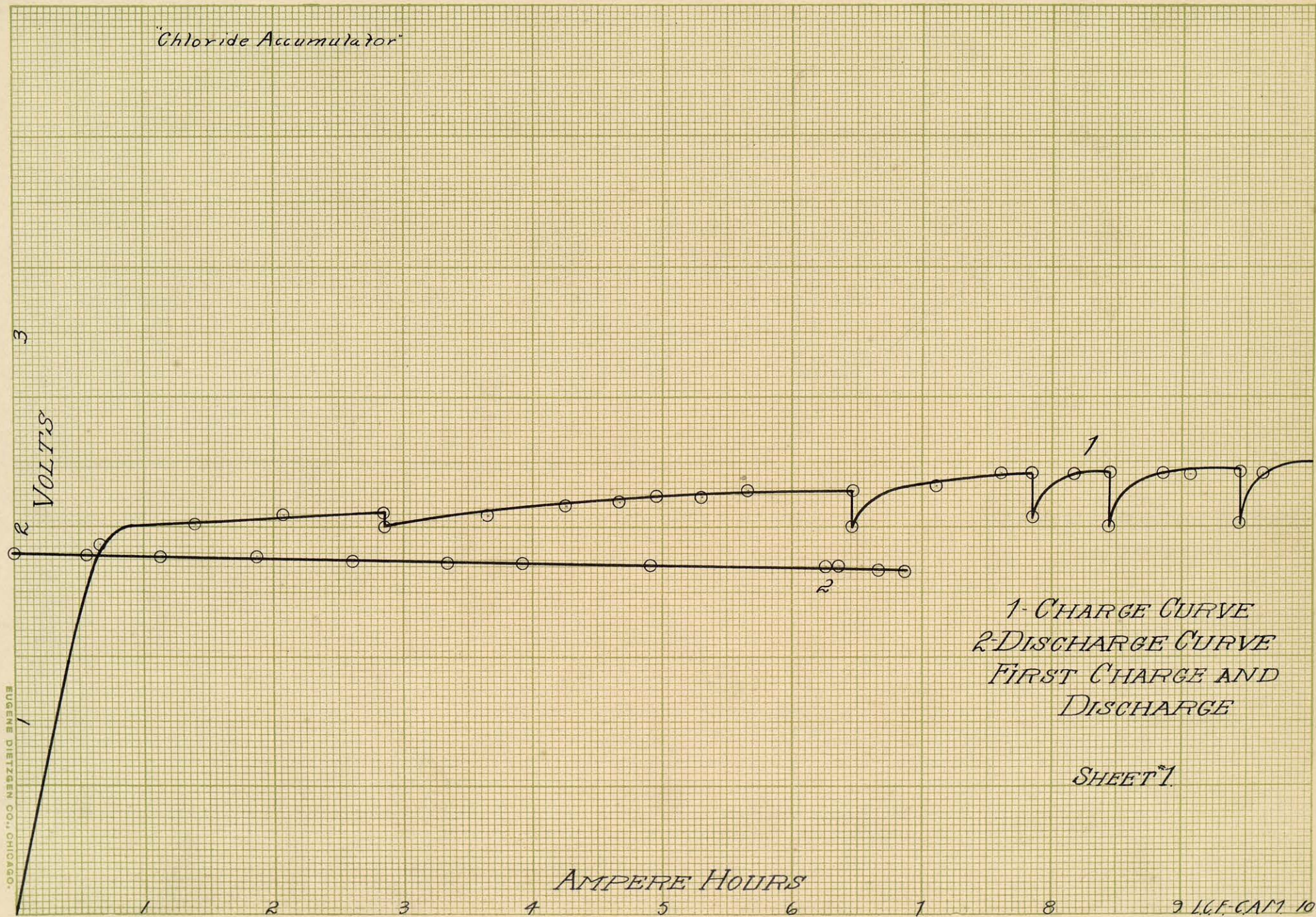
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