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MISCELLANEOUS FRAGMENTS

The Hygiene of Food and Diet
Eating for Health.

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FOODS.

THE body is constantly sustaining losses in consequence of the vital work performed by its various organs. Foods are substances which, when introduced into the body, make good its natural wastes and losses, and furnish proper material for the repair of its tissues, or for carrying on its vital processes. These requirements are met by organized matter, water, and oxygen, or what may be termed solid, liquid, and gaseous foods. Of these, the first only is commonly known as food. Liquid foods are called drinks, all of them having water for their essential element. Our attention will here be confined to the consideration of organized foods.

A poison is the opposite of a food. It not only does not repair wastes and losses, but interferes with the vital processes, disturbing them in such a way as to occasion sickness and death.

Animal and Vegetable Foods.—Man employs both animal and vegetable substances as foods. Some nations, particularly the English and the American, use a large proportion of flesh, and some barbarous tribes live almost wholly upon it; but the larger portion of the human race live chiefly upon vegetable foods. Many millions of human beings in India and other parts of Asia never taste flesh food, considering it a sin to do so.

Plants the only Food-Producers.—Plants alone possess the power to construct living substances out of the elements of the earth and the air. Animals are able to subsist upon organized substances only, so that a lion, in dining upon an antelope, is only eating at second hand the grass and herbs which the latter has eaten; and a man, in eating roast beef, is taking at second hand the corn upon which the ox was fed.

Food Elements.—When a chemist examines a loaf of bread or a piece of meat, he finds it to be made up of various substances quite unlike in nature. These

food elements each possess peculiar properties, and are destined for different uses in the body when taken as food.

Classification of Food Elements.

—The various substances found in foods may be included in six classes:
1. Starch; 2. Sugar;



FIG. 9.—STARCH GRANULES.

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3. Albumen (all albuminous substances); 4. Fats; 5. Salts; 6. Indigestible elements.

Starch.—This element is found only in vegetable foods. In a raw state, starch is found in small particles, or granules, each enclosed in a woody envelope. Starch is the most abundant of all the food elements. (Fig. 9.)

Sugar.—Sugar is very unlike starch in its general properties, although closely related to it. In the mysterious chemistry of plant life, the insoluble, tasteless starch is converted into this sweet and extremely soluble substance. Several different kinds of sugar occur in nature, the most important of which are cane-sugar, grape-sugar, and milk-sugar.

Cane-sugar is the sweetest of all the sugars, and is that commonly used as food. It is obtained from the sugar-cane, the sorghum plant, the beet root, and the maple-tree. Grape-sugar is found in most fruits and in honey. Milk-sugar gives to milk its sweetness. A sugar resembling grape-sugar, called glucose, is very extensively manufactured chemically, by boiling the starch of corn or potatoes with sulphuric acid. Glucose cannot be considered a perfect substitute for natural sugar.

Albumen.—The white of an egg is almost pure albumen. All true foods contain elements which in many respects resemble albumen, and serve the same purposes in the body, and so are termed albuminous elements. For convenience, we shall apply the term albumen to any or all of them. The lean portion of flesh and the casein of milk are forms of animal albumen. All vegetable foods also contain albumen. Casein, for example, is found in peas and beans, as well as in milk. One of the most important of all the albumens is gluten, which is found in wheat, rye, and barley.

Fats.—Oil, or fat, is found in both animal and vegetable foods. The principal animal fats used as food are butter, lard, suet, and tallow. Vegetable oils are chiefly derived from oily fruits, as the olive, from nuts, and from various seeds. A large quantity of fat is found in corn and oats.

Salts.—When a portion of animal or vegetable food is burned, there is left a residue of ashes, made up of inorganic, or mineral, elements. ~~These are~~ the so-called salts of the food. They do not exist in the food in the form in which they are found in its ashes, but in an organized form. Grains constitute the most important source of salts. Wheat, oats, barley, corn, and rye contain an abundant supply of this element, as do the potato and most other vegetables. The salts

also exist in milk in good proportion.

Indigestible Elements.— All vegetable foods contain more or less of a woody substance, called cellulose. The bran of wheat belongs to this class of elements. Cellulose is not to any extent digestible, but it serves an important purpose in giving bulk to the food. The connective-tissue elements of flesh foods—the ligaments, tendons, etc.—are hard to digest, and afford little or no nourishment.

In addition to the several elements mentioned, all food substances contain certain flavoring matters.

Condiments.— A condiment is an article which possesses little or no food value, but is added to food for the purpose of imparting to it a characteristic flavor. The condiments most commonly used in this country are mustard, pepper, ginger, spices, pepper-sauce, Worcestershire and other hot sauces, and vinegar. All condiments possess irritating or stimulating qualities. They stimulate the appetite, and act as whips to the stomach and other digestive organs, and are for this reason injurious.

Food Substances.— None of the several food elements which we have been considering are, in any

proper sense, to be regarded as food. An animal fed exclusively upon any one of them soon acquires such a disgust for its food that it will refuse to taste it, even though starving, and sooner or later dies. Gluten is the only exception to this rule. A true food contains various elements, which are combined in varying proportions in different foods. Let us now briefly notice some of the leading food substances.

Foods of Animal Origin.— Chief among animal foods is *milk*, the natural diet of most young animals. Milk contains the different elements of nutrition in proper proportion, and will sustain life for an indefinite period. The chief albuminous element of milk is casein. The white color of milk is due to the fact that it contains a considerable amount of fat, or oil, in a state of emulsion, or division into minute drops. By churning, the little drops are made to unite, producing butter. The ease with which it is digested renders milk a most suitable food for the young. It is, indeed, with rare exceptions, a most wholesome food for persons of all ages.

— *Cheese* made from milk by adding rennet, which separates the casein and fat from the whey, undergoes partial decomposition in the process of “curing,” and is on this account much less wholesome than fresh

milk. It is difficult to digest, and likely to interfere with the digestion of other foods. Sometimes a peculiar fermentation takes place in cheese, which produces a very poisonous substance, known as tyrotoxin. Very serious and sometimes fatal illness often results from the use of such cheese. This poison is destroyed by heat. On this account cheese is rendered less dangerous by toasting, while at the same time it is made more digestible.

Eggs.—An egg contains within itself every element needed for the support of the body, and has the advantage, when properly cooked, of being one of the most easily digested of foods, and one of very high nutritive value. When stale, however, eggs are exceedingly deleterious, and wholly unfit for food. An egg usually keeps perfectly fresh not more than three or four days, when exposed to the ordinary summer temperature. Eggs laid by fowls fed upon decaying meat and other unwholesome food, are unfit to eat.

Flesh.—The flesh of the ox, sheep, and hog is more largely used as food in this and most other civilized countries than any other kinds of flesh food. Mutton is not so well relished as beef by some, but it is nearly as nourishing, and equally as easy to digest. Pork contains much fat, and is difficult to digest, besides being likely to be diseased, and must be regarded as an inferior food. The Jews in ancient times were forbidden to eat the flesh of the hog, and they still abstain from the use of pork. The flesh of deer and other wild game, while usually less tender than that of stall-fattened animals, is more wholesome, if eaten when fresh, on account of the healthier conditions of life which wild animals usually enjoy. Game is often allowed to become almost putrid before it is eaten; such flesh is exceedingly unwholesome. Veal, like the flesh of all very young animals, is difficult to digest, and cannot be recommended as food.

Fish and Fowl.—The nutritive value of fish and fowl is not quite equal to that of beef or mutton; but when properly cooked, they are relished by most persons, and possess considerable value as foods.

Shell-fish contain very little nutriment, although some of them, oysters in particular, are in very great favor as table delicacies. All shell-fish are scavengers, however, and are sometimes poisonous. Frogs, lobsters, shrimps, sea-crabs, etc., are by many considered delicate eating, but cannot be regarded as really first-class foods. The oyster is easily digested, though it does not possess the power to digest itself, nor to aid digestion when eaten raw, as many persons suppose.

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The oyster is a scavenger in its habits ; and when the beds in which oysters grow are located so as to be reached by the impure matters carried into the sea by the sewers of a large city, the oysters sometimes become diseased, and produce serious illness when eaten. Typhoid fever has been traced to the use of oysters.

Salted and Smoked Meats.— Most kinds of flesh foods are preserved by salting. The process of salting hardens the tissues, thus rendering them difficult to digest. Smoked meats and fish are also hard to digest.

Vegetable Foods.— Vegetable foods are the original source of the nutritive elements contained in flesh foods ; hence we should expect them to furnish all the elements of nutrition, and in proper proportions. This is the case with the best vegetable foods. Vegetable foods are usually divided into three classes :—

Fruits, Grains, and Vegetables.— Fruits comprise fleshy seeds and seed bearing portions of plants, such as the apple, strawberry, and plum, each of which

represents a different class of fruits. Melons and nuts are also fruits. Grains comprise those seeds used as foods which are produced by grass-like plants, as wheat, oats, rye, barley, corn, and rice. Allied to this class are the edible seeds of pod-bearing plants, the chief of which are peas, beans, and lentils. Grains are the most nourishing of all foods, and contain the elements of food in the best proportion. Fruits, grains, and milk constitute a perfect dietary, and one particularly suitable for young persons, and for students and other brain-workers.

Those parts of plants used as food, other than seeds or fruits, such as leaves, stems, roots, buds, and flowers, are called vegetables. The nutritive value of vegetables is much less than that of grains. The potato, one of the most valuable of all vegetables, is three fourths water, and contains only about two per cent. of albuminous elements. The starch of vegetables is more difficult to digest than that of grains and fruits, and the large amount of woody matter contained in most vegetables adds to their indigestibility ; so that they must be regarded, in general, as much inferior to fruits and grains as foods.

Peptogens.— Certain properties and elements of the food serve to stimulate the action of the glands by which the digestive fluids are produced. For example, the quality of dryness in the food powerfully excites the action of the saliva. In experiments conducted by the author in the Laboratory of Hygiene of the Battle Creek Sanitarium (Michigan, U. S. A.) it has been proved that dry food stimulates the secretion of saliva more than four times as much as moist food.

Gluten, albumen, and other proteid substances stimulate the glands of the stomach to produce gastric juice. The same is true of dextrin. This fact is of considerable interest, as it emphasizes the importance of thorough mastication of the food. In this way the food has mixed with it an abundant quantity of saliva, by whose action upon the starch, the dextrin is produced.

The natural flavors of foods stimulate the activity of all the digestive glands; but condiments, such as mustard, pepper, pepper-sauce, and other substances which burn and sting as they go down the throat, do not stimulate the secretion of normal digestive fluid. They simply provoke resistance and defense, causing an abundant flow of mucus wherewith to protect the mucous membrane from their harmful action.

Uses of the Several Food Elements.—The various food elements serve different purposes in the

body. Sugar, starch, and fat make adipose tissue, and in the form of fat enter into the composition of nearly all the tissues of the body. They are of important service to the body in the production of heat and force. The different forms of albumen nourish especially the brain, nerves, muscles, glands, and other highly active tissues of the body. The salts are largely used in nourishing the bones. They are also required by the brain and the nerves, as well as by other tissues. The indigestible elements give necessary bulk to the food.

DIGESTIBILITY OF VARIOUS FOODS.

	Mr. Min.		Mr. Min.
Rice	1 00	Mutton, broiled.....	3 00
Sago	1 45	Veal, broiled.....	4 00
Tapioca.....	2 00	Veal, fried.....	4 30
Barley	2 00	Fowl, boiled.....	4 00
Milk, boiled.....	2 00	Duck, roasted.....	4 30
Milk, raw.....	2 15	Butter, melted.....	3 30
Venison, broiled.....	1 35	Cheese	3 30
Turkey, roasted.....	2 30	Soup, marrow-bone.....	4 15
Turkey, domestic, boiled	2 25	Soup, bean.....	3 00
Goose, roasted.....	2 30	Soup, mutton	3 30
Lamb, broiled.....	2 30	Corn and beans, green ...	3 45
Eggs, hard boiled.....	3 30	Chicken soup, boiled....	3 00
Eggs, soft boiled.....	3 00	Beans, pod, boiled.....	2 30
Eggs, fried.....	3 30	Bread, wheaten	3 30
Eggs, raw.....	2 00	Bread, corn	3 15
Eggs, whipped.....	1 30	Apples, sour and mellow,	
Trout, boiled.....	1 30	raw	2 00
Salmon, salted, boiled...	4 00	Apples, sweet and mel-	
Oysters, raw.....	2 55	low, raw	1 30
Oysters, stewed.....	3 30	Parsnips, boiled	2 30
Beef, lean, rare roasted...	3 00	Beets, boiled.....	3 45
Beefsteak, broiled.....	3 00	Turnips, flat, boiled....	3 30
Beef, lean, fried.....	4 00	Potatoes, Irish, boiled...	3 30
Beef, salted, boiled.....	4 15	Potatoes, Irish, baked...	2 30
Pork, roasted.....	5 15	Cabbage, raw.....	2 30
Pork, salted, fried.....	4 15	Cabbage, boiled.....	4 30
Mutton, roasted.....	3 15		

Table of Food Values.

FOOD SUBSTANCES.	Water.	Aluminous Elements.	Starch.	Grape Sugar.	Cane Sugar.	Free Fat.	Free Acid.	Pectose.	Non-Nitrog. Substances. ¹	Salts.	Cellulose.	Proport. Carbon to Nitrogen ²	Total Nutritive Value.
GRAINS.													
Wheat, Poland.....	13.2	21.5	61.9	...	...	1.5	...	...	...	1.0	...	2.9	86.8
Mich. White.....	12.8	11.6	71.	...	...	1.3	...	...	...	1.6	1.7	6.2	85.5
" Dishie.....	12.2	13.6	72.2	...	...	...	...	...	...	1.8	...	5.2	87.5
Japanese.....	12.4	16.5	65.1	...	...	1.6	...	...	...	1.5	2.9	4.1	84.7
Rye, Winter.....	8.7	11.	74.6	...	...	1.9	...	...	...	2.3	1.5	6.9	89.5
German.....	8.	14.	78.	...	...	...	...	...	...	...	...	...	82.
Barley.....	14.	10.5	66.7	...	...	...	...	...	...	2.6	3.8	6.5	82.2
So. Russian.....	14.	12.7	70.9	...	...	2.4	...	...	...	2.4	...	5.5	86.2
Oats.....	12.	10.7	58.3	...	...	7.3	...	...	...	3.3	17.9	6.1	80.1
Corn, Flint.....	13.1	10.2	68.5	...	...	4.3	...	...	...	1.4	1.7	7.1	84.9
Dent.....	13.4	9.4	68.5	...	...	5.	...	...	...	1.5	2.2	7.8	84.4
Sweet.....	13.4	11.4	62.7	...	...	7.8	...	...	...	1.8	2.9	6.1	83.7
Rice.....	12.6	6.7	78.5	...	...	...	...	...	...	...	...	11.8	80.9
Millet.....	11.8	10.5	68.2	...	...	4.2	...	...	...	2.8	2.5	6.9	85.7
Buckwheat.....	12.7	10.	71.8	...	...	1.9	...	...	...	1.9	1.7	7.3	85.6
Iceland Moss.....	16.	22.	56.3	...	...	1.4	...	...	...	1.4	2.9	2.6	81.2
FLOUR.													
Graham.....	13.	11.7	69.9	...	...	1.7	...	...	...	1.8	1.9	6.1	85.1
Wheat.....	11.6	11.1	75.4	...	...	1.1	...	...	...	.6	.2	6.8	88.2
Rye.....	13.7	11.6	69.7	...	...	2.	...	...	...	1.4	1.6	6.1	84.7
Barley.....	14.8	11.4	71.2	...	...	1.5	...	...	...	.6	.5	6.3	84.7
Oat.....	7.7	15.1	67.2	...	...	7.1	...	...	...	2.	.9	4.9	81.4
Corn.....	14.2	9.7	69.5	...	...	3.8	...	...	...	1.3	1.5	7.9	84.3
Buckwheat.....	13.5	8.9	74.3	...	...	1.6	...	...	...	1.	.7	8.5	85.8
Bean.....	10.3	23.2	59.4	...	...	2.1	...	...	...	3.3	1.7	8.6	88.
Pea.....	11.4	25.2	57.2	...	...	2.	...	...	...	2.9	1.3	2.3	87.3
Banana.....	14.9	2.9	77.9	...	...	.5	...	...	...	2.2	1.6	27.	83.5
Arrowroot.....	18.	...	82.	...	...	...	...	...	...	...	...	62.	82.
BREADS.													
Barley.....	12.4	9.4	64.4	4.7	...	1.	...	...	...	3.8	4.3	7.4	83.3
Whole Wheat.....	13.	8.7	60.	4.	...	6.	...	...	...	3.	5.3	8.	82.7
White.....	45.1	5.3	46.	2.3	...	...	...	...	...	.5	...	9.2	84.9
Rye.....	42.3	6.1	46.9	2.3	...	4.	...	...	...	1.5	.5	8.1	87.2
Swedish Speise Brod.....	12.	10.	72.3	3.1	...	1.6	...	...	...	...	1.	7.7	87.
Zwieback, White.....	13.3	8.5	73.3	1.8	...	1.	...	...	...	.6	1.5	9.	85.2
Rye.....	11.6	9.3	67.7	3.6	...	1.	...	...	...	2.1	4.7	7.7	83.7
Macaroni.....	13.1	9.	76.8	...	...	3.	...	...	...	.8	...	8.5	86.9
Manna.....	15.3	1.9	18.1	49.*	...	...	...	...	5.6	...	10.1	38.	74.6
FRESH FRUITS.													
Apple.....	84.8	.4	...	7.2	...	.8	4.8	...	...	.5	1.5	28.	17.7
Apricot.....	81.2	.5	...	4.6	...	1.2	6.4	...	...	.8	5.3	9.2	13.5
Blackberry.....	86.4	.5	...	4.1	...	.2	1.4	...	...	.4	7.	8.2	6.6
Banana.....	73.	1.9	...	...	...	.6	...	23.2	...	1.	.3	12.5	26.7
Cherry.....	79.8	.7	...	10.2	...	.9	1.8	...	...	.7	3.9	14.5	14.8
Cranberry.....	89.6	.1	...	1.5	...	2.3	...	...	...	.2	6.3	15.	4.1
Currant.....	84.7	.5	...	6.4	...	2.2	.9	...	...	.7	4.6	12.8	10.7
Grape.....	78.2	.6	...	14.3	...	.8	2.	...	...	.5	3.6	23.8	18.2
Gooseberry.....	85.7	.5	...	7.1	...	1.4	1.4	...	...	.4	3.5	14.2	10.8
Pear.....	83.2	.4	...	8.2	...	.2	3.3	...	...	.3	4.4	20.5	12.4
Prune.....	81.2	.8	...	6.2	...	.8	4.9	...	...	.7	5.4	7.7	13.4
Plum.....	84.9	.4	...	3.6	...	1.5	4.6	...	...	.7	4.3	9.	10.8
Peach.....	80.	.7	...	4.5	...	.9	7.1	...	...	.7	6.1	6.4	13.9
Raspberry.....	85.7	.4	...	3.9	...	1.4	.7	...	...	.5	7.4	9.7	6.9
Strawberry.....	87.6	1.1	...	6.3	...	.5	.9	...	...	.8	2.3	6.1	10.1
Whortleberry.....	78.4	.8	...	5.	...	1.6	.9	...	...	1.	12.3	6.2	9.3
DRIED FRUITS.													
Prune.....	29.3	2.3	.2	44.4	.5	2.7	4.3	13.4	1.4	1.5	85.4	69.2	69.2
Pear.....	29.4	2.	10.3	29.1	.4	...	4.5	14.9	1.7	6.9	27.3	63.7	63.7
Apple.....	27.9	1.3	5.0	42.8	.8	...	3.6	4.8	1.6	5.1	42.8	67.	67.
Cherry.....	49.8	2.	...	31.2	...	.3	...	14.3	1.6	2.4	22.9	49.4	49.4
Raisin.....	32.	2.4	...	54.6	...	.6	...	...	7.5	1.2	1.7	26.1	66.3
Fig.....	31.2	4.	...	49.8	...	...	...	...	2.9	12.1	12.4	26.7	26.7
Date.....	33.	9.	...	58.	...	...	...	...	...	...	6.4	67.	67.

¹ Chiefly sugar and starch.

* Mannite.

FOOD SUBSTANCES.	Water.	Albuminous Elements.	Starch.	Grape Sugar.	Cane Sugar.	Free Fat.	Free Acid.	Pectose.	Non-Nitrog. Substances.	Salts.	Cellulose.	Proper Carbon and Nitrogenous	Total Nutritive Value.
NUTS.													
Chestnut	7.3	14.6	69.			2.4				3.3	3.4	4.8	89.3
Walnut	7.2	15.8	13.			57.4					4.6	4.4	88.3
Hazelnut	7.1	17.4	7.2			62.6				2.5	3.3	4.	89.7
Sweet Almond	6.2	23.5	7.8			53.				3.	6.5	2.6	87.3
Peanut	6.5	28.3	1.8			46.2				3.3	13.9	1.7	79.6
Cocanut	46.6	5.6	8.			35.9				1.	2.9	7.8	50.5
Syrup	24.6			26.2	44.9				2.	2.3		73.1	75.4
Honey	20.6	8		72.8	1.8				3.8	2		98.	79.4
VEGETABLES.													
Carrot	86.8	1.2				.3			9.2	1.	1.5	7.9	11.7
Winter Cabbage	80.	4.		1.2		.9			10.4	1.6	1.9	3.1	18.1
Red Cabbage	90.	1.8		1.7		.2			4.2	.8	1.3	3.3	8.7
White "	90.	1.9		2.3		.2			2.6	1.2	1.8	2.6	8.2
Spinach	88.5	3.5		.1		.6			4.3	2.	1.	1.4	10.5
Celery	84.1	1.5		.8		.4			11.7	.8	1.4	8.1	14.5
Head Lettuce	94.3	1.4				.3			2.2	1.	.8	1.8	4.9
Potato	75.	2.2				.2			21.	1.	.6	9.6	24.4
White Turnip	92.5	1.5				.2			3.	.7	2.1	2.1	5.4
Beet	87.5	1.3				.1			9.	1.1	1.	1.	11.5
Sugar Beet	71.6	2.		12.6		.5			.7	1.	11.6	6.9	16.8
Parsnip	82.	1.2				.6			7.2	1.	.8	6.5	10.
Sweet Potato	71.8	1.				.2			25.3	.7	1.	25.5	27.2
Cucumber	95.2	1.2		1.					1.4	.4	.8	2.	4.
Asparagus	93.7	1.8		.4		.3			2.3	.5	1.	1.6	5.3
Cauliflower	90.9	2.5		1.2		.3			3.4	.8	.9	2.	8.2
Melon	90.4	1.		2.2		.3			4.	.7	1.4	6.5	8.2
Squash	90.3	1.1		1.4		.1			5.2	.7	1.2	6.1	8.5
Onion	86.	1.7		2.8		.1			6.	.7	.7	6.4	13.3
Pumpkin	90.3	1.1	5.1	1.5		.1			7.	1.2	1.2	6.	8.5
Tomato	92.4	1.6		2.5		.3	1.8			.6	.8	2.8	6.8
Peas, green, garden	78.4	6.4	12.			.5				.8	1.9	2.	19.7
small	10.3	24.6	52.6			3.5				2.6	6.4	2.2	83.3
African	6.5	23.4	57.8			6.				3.	3.3	2.7	90.2
green shelled	12.7	21.2	57.7			1.9				2.8	3.2	2.7	84.1
Beans, field	13.5	25.	48.3			1.7				3.5	8.	2.	78.5
French or Kidney	11.	23.7	55.6			2.2				3.7	3.8	2.4	85.2
white	15.	26.9	48.8			3.				3.5	2.8	1.9	82.2
Lima	9.	21.9	60.6			1.6				2.9	4.	2.8	87.
String beans	88.7	2.7	5.5	1.2		.1				.6	1.2	2.5	10.1
Lentils	12.3	25.9	53.			1.9				3.	3.9	2.1	83.8
German	11.7	33.	30.3			8.7				2.7	13.6	1.2	74.7
MILK AND BUTTER.													
Mother's milk	89.1	.9				5.4				.4			
Cow's "	86.	4.1				5.2	3.9			.8		2.2	14.
Cream	66	2.7				28	20.7			1.8		11.	34.
Swedish Butter	13.8	.6				.6	84.4			.6		141.	86.2
French "	12.6					.2	86.4			.8		86.6	87.4
Cheese, Stilton	32.	26.2				34.5	3.3			4.		1.4	68.
Skimmed milk	88.	4.				3.8	1.8			.8		1.4	10.4
Buttermilk	88.	4.1				3.6	.7			.8		1.	9.2
Milk of Cow Tree	58.	1.7				2.8	35.2			.5		2.2	40.2
MEATS.													
Lean Beef	72.	19.3				3.6				5.1		.18	28.
Lean Mutton	72.	18.3				4.0				4.8		.26	28.
Veal	63.	16.5				15.8				4.7		.95	37.
Pork	39.	9.8				48.0				2.3		4.9	61.
Poultry	74.	21.				3.8				1.2		.18	26.
White Fish	78.	18.1				2.9				1.		.16	22.
Salmon	77.	16.1				5.5				1.4		.34	23.
Entire Egg	74.	14.				10.5				1.5		.75	26.
White of Egg	78.	20.4								1.6			22.
Yolk of Egg	52.	16.				30.7				1.3		1.9	48.

A Light Diet

The reader will find it very profitable to make a careful study of the preceding table. One of the most interesting facts which will be discovered by such a study is that those articles of food which are ordinarily considered as light in character, are really most nutritious. ^{it will be noticed that} For example, wheat, corn, oats, rice, and other grains, ~~as will be seen by referring to the table,~~ have three times the nutritive value of beefsteak or mutton, although the latter are commonly regarded as much more highly nourishing than the grains. This popular notion, ^{is shown} however, ~~is~~ by scientific facts worked out in the chemical laboratory and summarized in the table, ~~show~~ to have no foundation whatever. ^H This fact is made still more conspicuous when, by referring to the table showing the digestibility of various foods (see page), it is found that grains are not only more nourishing than flesh foods, but are at the same time more digestible. Compare, for example, the fact that boiled rice digests in one hour, whereas a broiled beefsteak requires three hours, and roast pork five and a quarter or six hours ^{so-called} hours. "Hearty" food is not more nourishing than the food which is usually ^{described} ~~prescribed~~ as a ~~so-called~~ "light dietary", ^{it} ~~but~~ is simply less digestible.

MEDICAL USES OF FRUIT. — Although our space is too limited ^{for} ~~to under-~~ ~~take~~ anything like an extended study of even a small portion of the numerous substances which are employed as foods in different parts of the world, we may perhaps with profit devote a few pages to the consideration of the more important classes of foods. ~~And first,~~ ^{first} we will consider some of the more common fruits which are employed as foods.

Of the several classes of food substances, fruits appear ^d to be the least appreciated for their nutritive value. ~~Among all classes,~~ ^{They} fruits are quite generally regarded as a luxury rather than as foods, and are eaten to please the palate, rather than to nourish the body.

The great hygienic and nutritive value of fruit is apparently a fact unknown to the majority of people. ^{yet} Their importance in the list of food substances can, ~~however,~~ ^{be} scarcely overestimated, ^{The truth of this assertion} ~~as will appear when we consider~~ ^{is proved by} the consequences of the entire withdrawal of fruit from the dietary, as ~~is sometimes seen~~ in the case of sailors and travelers ^{who,} ~~when~~ ^{other} long confined to a meat diet, although provided with an abundance of food they not infrequently become affected with a serious disease known as scurvy, in which the body swells as in dropsy, the gums ulcerate, the teeth become loose in their sockets, the vital powers rapidly decline, and death occurs unless relief is soon obtained. ~~A doctor may administer to a patient suffering from scurvy,~~ ⁹⁷ tonics, restoratives, stimulants, alteratives, and any or all of the most powerful drugs known to the ^{medical} profession ^{may be administered to a patient suffering from scurvy,} ~~to aid digestion and help the liver, but the patient is~~ ^{without his becoming in any} ~~in no way~~ the better. Yet the addition of a few lemons, oranges, bananas, or other fresh fruit, to his dietary, will quickly restore him to his ^{normal} former condition of health, and without any other change whatever in his dietary or his conditions. ~~No more favorable illustration of the powerful influence of fruits upon the vital economy than this fact, is known.~~ ~~Yet~~ ^{and soldier} this lesson, so often taught us by the experience of sailors, ^{seems,} ~~to have been very little appreciated,~~ and thousands of persons are suffering from a sort of ~~land~~ scurvy because of their neglect to make free use of ^{fruits.} ~~this most important class of foods.~~

The proportion of nitrogenous elements found in fruit is not large, ^{the} water contained in them varying ^{from} ~~from~~ ^{from} seventy-five to ninety-five per cent, but the acids and other substances contained in the juices are most powerful nutritive tonics, ~~or stimulants,~~ ^{other} aiding the ~~processes of digestion,~~ ^{processes} and probably ~~of the vital powers as well,~~ in a

~~tained in the juices of fruits are most powerful nutritive tonics or stimulants, aiding the processes of digestion, and probably of the vital processes as well, in a most remarkable manner. In their uses,~~
 Fruits should be taken in connection with the meal, ~~they should be a part of it,~~ and should be eaten ~~along~~ with other articles of food, especially ~~those~~ ^{the} which require ~~a~~ thorough mastication, such as bread, instead of being taken by themselves, at the beginning or the close of the meal.

Most ripe fruits contain little or no starch, ^{while} unripe fruits contain a considerable quantity of ~~starch~~. Hence ~~unripe~~ or immature fruits should never be eaten raw, but should be thoroughly cooked, as raw starch is not digestible in the stomach. It is ~~thus~~ ^{for this reason} that unripe fruits produce serious indigestion in the raw state, ^{when taken} ~~when~~ they may be eaten ^{while} after cooking with impunity. As a rule, however, it is better that fruits should be thoroughly ripened, whether they are to be eaten cooked or raw. The process of ripening is a sort of natural cooking ~~process~~, the starch being converted into dextrine, sugar, and ~~acids~~ ^{fruit}.
 acids.

The abundant use of fruits is exceedingly helpful in many morbid conditions, ^{They are valuable} especially in cases of inactivity of the bowels and in most disorders of the kidneys, ^{on account of the laxative and diuretic nature of} ~~the juices of fruits are usually~~ laxative and diuretic, and hence they are ~~valuable for the diseases~~ mentioned. ^{Fruits vs. Germs} Another important use ^{reason for the} for fruits, which has been little, if at all, appreciated until developed by experiments conducted under the

writer's supervision in the Battle Creek Sanitarium Laboratory of Hygiene, (Battle Creek, Mich., U. S. A.) ^{their power to} is ridding the stomach of germs. The coated tongue is always an indication of the presence of germs in the stomach. These germs are produced ^{by} diseases, ^{and} they particularly give rise to ~~such maladies as~~ headache, ~~nausea~~, ~~and~~ various symptoms.

~~of~~ indigestion, and through their remote effects ~~give rise~~ to
 consump~~ti~~ on, Bright's disease, skin diseases, and various forms of
 nervous diseases. ^Q By the experiments referred to, the discovery ~~was~~ ^{has}
^{been} made that these disease-producing germs will not grow in fruit juice,
 although they ~~grow abundantly~~ ^{flourish} in the juice of meats, ~~in~~ beef-tea, and
~~other animal substances, as milk. Hence, fruit is exceedingly valuable~~
~~in medical dietetics, as a means of driving out germs from the stomach.~~

These germs are also present in great quantities in cases of bilious-
 ness, sick-headache, nervous headache, etc., and in a ~~very~~ great variety
 of forms of disease ~~known~~ ^{which} to nervous dyspeptics. ^{are subject} By an exclusive
 fruit diet, ~~adhered to~~ ^{at least one} for a few days, or ~~a diet which contains~~ ⁱⁿ ~~nothing~~ ^{little}
~~else but~~ ^{besides} fruit, the germs are starved out, and a rapid cure is effected.

This is a ^{certainly} far better means of getting rid of so-called biliousness
 than the employment of such remedies as calomel and purgatives, which,
 while they do dislodge a multitude of germs, at the same time ~~they~~
 irritate and injure the stomach and intestines, thus increasing the ~~dis~~
 disposition to a renewal of the same conditions for the removal of
 which the remedy was applied. ^Q ~~fruit and nut diet.~~ This explains the great value of the

"grape^cure," which has long been known and practiced in various parts of
 Switzerland, California, and other grape-growing countries. The use
 of other fruits, as the apple, fig, peach, banana, ^{almost} has been found
 equally efficacious. The great objection to this diet has been the
 inability to keep the patient confined to an article of food so little
 rich in nutritive elements as fruits, for any length of time, ^{but by} the
 addition of nuts, themselves a variety of fruit, the "fruit-cure" may
 be continued for an indefinite length of time. Some persons find them-
 selves entirely free from various digestive ^{and} nervous disorders while
 living upon a diet consisting of fruits and nuts, who become exceedingly
 wretched as soon as they attempt ~~the~~ ^{even} to digress to a small degree from

this dietary. By a proper combination of fruits and nuts, it is entirely possible to sustain life and maintain all the vital processes in their highest condition.

The Best Fruits. - While all ^{and} cultivated fruits, ~~are wholesome,~~ as well as many wild ones, ^{are wholesome,} ~~which have not been domesticated,~~ there are a few which may be especially mentioned for their marked excellence.

At the head of the list may be placed -

The Apples. - Of no other fruit have we so large a variety, each possessing its characteristic excellence, as of ^{the} apples. Its keeping qualities are superior to those of ^{almost any} ~~nearly all~~ other fruits, and it is, on the whole, the most palatable and desirable of all fruits. Apples have a high nutritive value, are easily digested, especially when baked or roasted, and when freely used, are often found to be an excellent remedy for inactivity of the bowels.

The Peaches. - This luscious fruit is said to be related to the almond. Unfortunately, it is very perishable, so that it can be used in the fresh state only for a few weeks in the autumn. Bacteriologists, ⁱⁿ ~~have been~~ making a study of the peach, ^{recently} and have learned that the soft down which covers it hides great multitudes of microbes; consequently the fruit should never be eaten without first removing the skin.

The Pears. - This hardy fruit is very widely dispersed, and rivals the apple both in variety and in value. Its nutritive properties are essentially the same as those of the apple, except that those varieties of the pear which contain small woody particles known as "pips" are less digestible than ripe ^{mellow} apples.

The Plums. - This fruit, with its near relative, the prune, has a higher nutritive value than ~~either~~ apples, pears, or peaches, and is

~~The Strawberry is~~
in proportion to its nutritive value,
* said to contain a larger amount of iron than any other fruit, and ~~to~~
enjoys, in this respect, preeminence over most other ~~fruits~~ *foods*. There
is ~~no~~ ^{any} one suffering from an impoverished condition of
the blood ~~who~~ would ~~not~~ prefer a dish of fine, ripe strawberries
to the most palatable preparation of iron which could be ~~offered~~ *prepared*,
, and it is more than probable that iron taken in the form in
which ~~Nature~~ presents it in strawberries and other ^{fruits and} vegetable
foods is of vastly greater service to the system than ~~when pre-~~
~~sented~~ in any other way.

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an exceedingly valuable fruit. The prune is, for many persons who suffer from inactivity of the bowels, an excellent food remedy. The fruit is very digestible when thoroughly cooked, ^{especially} if care is taken to reject the skins.

THE CHERRY. - This fruit possesses ^{the} highest nutritive value ^{of} ~~of~~ ^{than} any other fruit grown in temperate regions, its nutritive properties constitute ^{some} twenty-five per cent. of its weight, of which thirteen percent. is sugar.

THE GRAPE. - This is one of the most valuable of ~~all~~ fruits. It is highly nourishing, and ^{very easily digested,} ~~one of the most digestible of all fruits.~~ It should be remembered, however, that the seeds and skins are indigestible. The skins should always be rejected, and ^{those} ~~individuals~~ suffering from dilatation of the stomach, catarrh of the stomach, or a ^{my} sensitive condition of the ~~stomach~~ ^{organ}, as indicated by soreness in the epigastrium, or the pit of the stomach, should always carefully avoid the seeds.

THE STRAWBERRY. - This most delicious fruit grows in both ^{or} the wild and a domestic state. The wild berries are even more delicious than the domestic fruit, although smaller. ^{the strawberry} ~~It~~ is easily digested, and constitutes, with peaches, grapes, and whortleberries, the most digestible of all fruits. ~~It is reported to contain more iron than any other fruit.~~

THE ORANGE. - This excellent fruit is valuable for its juices and the acid substances which it contains. The orange is an excellent remedy in many forms of indigestion. Two or three oranges taken before breakfast will be found a successful food remedy in many cases for inactivity of the bowels.

THE LEMON. - This fruit, with its near relatives, the citron, the lime, and the grape-fruit, is closely allied to the orange, like which it is valuable only for its juice. Lemons and limes are valuable chiefly in the preparation of cooling drinks for the heated season of

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the year, and as furnishing a wholesome vegetable acid ~~which should be adapted~~ as a substitute for vinegar, which is not only quite inferior in flavor to the lemon or lime juice, but is, besides, likely to contain numerous ^wwiggling worms known as eels, ~~and which~~ is also objectionable from the fact that it is the product of ferment, while the juices of fruits are natural and wholesome products.

mulberry,

Berries. - The whortleberry, gooseberry, raspberry, blackberry, ^{or} and the currant, are fruits which furnish valuable acids, but have little nutritive value, and for some classes of patients are unwholesome on account of the great number of small seeds which they contain.

(Quote from p. 92 MSS, marked a.)

THE DATE. - This is unquestionably one of the most valuable of all fruits, and in its dried state its nutritive value is nearly three times that of beef steak or mutton, although of the several nutritive elements sugar constitutes fully two thirds. The date constitutes almost the sole food of the Arab, ^{as well as} ~~and the diet~~ of his horses, dogs, and camels, ~~as well~~.

THE OLIVE. - This most remarkable fruit is unique in the fact that its pulpy rind contains an exceedingly large proportion of bland oil, which alone gives the fruit its value. When ripe, the olive constitutes a nutritious food which may be taken advantageously in connection with other food, although by itself it would be likely to produce derangement of the digestive and nutritive functions. ~~It is, however,~~ ^{however,} taken in a green or pickled state, ~~in which form~~ it is so indigestible that its nutritive value is too small to be considered, and must be regarded as unwholesome.

THE FIG. - The fig, both in its fresh and dry state, is ~~the~~ ^a most wholesome, digestible, and ⁿurishing food. In its dried form it has the highest nutritive value of any fruit, and constitutes a ~~very~~ ^{very} exceedingly wholesome and palatable food, capable of sustaining life for an indefinite period. The fig has long been noted as an exceedingly valuable food remedy for constipation or inactivity of the bowels.

THE BANANA. - In tropical countries the banana, ^{with} ~~and~~ its relative, the plantain, is considered ~~to be the~~ most valuable of all fruits, and ~~is~~ ^{constitutes an} unquestionably ~~the most~~ important ~~of~~ food substances. The banana plant is a most prolific source of food, producing in a given space nine or ten times as much food material as could be grown ^{if the ground were planted to} to potatoes, and more than one hundred times as much as ~~could be produced~~ ¹ if ~~the~~ ^{it} ~~ground were~~ ^{rown} planted to wheat. Its nutritive value is nearly equal to that of beef steak. Three or four good-sized bananas are equal in food value to a pound of bread, and when well-ripe, are easy of digestion. They constitute the sole food of millions of ^{the} natives in South America

and in some portions of Africa.

The TOMATOES. — This excellent fruit, ordinarily classed as a vegetable, has only recently come into general use. When well ripened it may be eaten raw, although it is greatly improved both in flavor and digestibility by cooking. ²⁵ The free use of ~~tomatoes~~ especially increases the activity of the bowels. The tomato is readily grown, and is unquestionably one of our most wholesome fruits.

MELONS. — The various varieties of watermelons, cantelopes, and muskmelons are valuable only for their delicious juices, which furnish a fluid of a most pure and delicious sort, distilled in nature's ^{own} still. In countries in which good water is not abundant, ~~the use of melons~~ may constitute an important source of pure water supply for drinking purposes.

TROPICAL FRUITS. — The pineapple, the pomegranate, the sapote, the breadfruit, ^{the} tamarinds, and numerous other most nutritious and delicious fruits, are grown in the various tropical regions. Some of these possess a high nutritive value, ^{while} others have little value except for the delicious juices which they contain. Many of them have strong characteristic flavors, for which a relish must be acquired by use.

to rid them of germs and dirt.

Fruits should be thoroughly washed before eating. In case of fruits which have a tough skin it is best to reject the skin,

Some fruits
as well as the seeds, so far as possible. ~~Still~~ ^{however,} there is ^{no} foundation for the notion that small seeds are likely to produce inflammation of the bowels or appendicitis; but persons suffering from a ^{spasm} of the stomach or bowels, or from dilatation of the stomach, ^{should} ~~must~~ avoid the use of seedy fruits.

*Respecting
Suggestions about the
Use of Fruits.*

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*Some of these germs are
shown in fig. 9*

Stewed fruits are, as a rule, more digestible than raw fruits, ^{ed} provided they do not contain too large an amount of cane-sugar, for the reason that fruits with firm flesh are ~~thus~~ softened ^{by the cooking,} and ^{surface} that the germs ~~which are~~ often found upon ~~the fruit~~ are destroyed. ~~The presence of these~~ germs which are generally swallowed with fruit when it is eaten raw ^{are} is a prolific ~~cause~~ cause of the unpleasant symptoms ^{sometimes} which occur ~~in many persons~~ from the use of raw fruit. The Acidity and flatulance are especially due to this cause. Another cause of the disagreement of ^{raw} fruits with many persons is the fact that they are not sufficiently masticated. This is especially true of such fruits as the apple, the cherry, and the pear, particularly the latter, which is ~~more~~ likely to disagree with invalids, ~~than almost any other fruit,~~ ^{both} owing ~~not only~~ to the hardness of its flesh, ^{and} but the ~~hard~~, indigestible, woody particles which it contains.

Dry fruits are less digestible than either fresh or stewed fruits. Canned fruits, if put up with little or no sugar, and ^{if} especially preserved in glass, ^{are} ~~would be~~ entirely wholesome.

Stale, decaying, ^{or} unripe fruits are unfit to eat. ~~Fruit from barrels or packages containing a large amount of decayin, fruit~~
Very acid fruits disagree with persons suffering from hyperpepsia, for the reason that they increase the already too great acidity of the stomach. The acids of some fruits, as the lemon, when taken in large quantity, ^{and} interfere with the digestion of starch, hence may give rise to indigestion.

*more about diets for children
for team persons & description*

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drochloric acid whatever was present in the stomach, consequently a strictly aseptic or antiseptic dietary was necessary.

GRAINS.--The grains most largely used by human beings are wheat, corn, oats, barley, and rice. Other seeds produced upon grass-like plants, which might be considered ^{as} grains, are used in various countries, especially by uncivilized people, but those mentioned are the great staples for the human race. In the Northern part of the United States, wheat is chiefly used; in the South ^{in part} ~~corn~~ ^{is more commonly used.} In India, China, and other Asiatic countries rice is the staple. In Germany, Russia, and the Scandinavian Countries, rye and barley are very largely used. In Ireland and Scotland oatmeal is more largely used than any other grain. Its use in Scotland is so universal that ^{Dr. Samuel} Ben Johnson was led to define oatmeal, in the first edition of his dictionary as "Food for horses in England and for men in Scotland," to which a witty Scotchman replied, "And where can you find such fine horses as in England, and such fine men as in Scotland?"

Grains are among the choicest products of the earth, containing all the elements of nutrition, and, with the exception of rice, in about the same proportion, ^{in adequate amount for the nourishment of the body} ~~and in adequate amount for the nourishment of the body.~~ That even rice, which contains the smallest amount of albuminous elements, and generally supposed to contain less of ~~the~~ blood and tissue-forming element than is required for complete nutrition, is capable of sustaining life

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It may be added, however, that some

of the several varieties of rice raised in China, ~~which are known in this country, some~~ contain a considerably larger proportion of blood-forming

elements than is found in the rice of commerce. ~~It should be added,~~

~~also, that~~ ^{also} the Japanese and Chinese make large use of the Soja-bean,

which contains thirty-five per cent of proteids; while the natives of

India use dahl, another legume, which, like all other of the pulses, is

rich in proteid matter.

~~to stable population~~ 193

and strength is shown by the fact that millions in China, Japan, and India, especially in the latter country, ^{of people} make it their ^{almost} sole article of food during a long life time. Rice is perhaps the most digestible of all the grains, and is, on this account, very valuable for invalids.

^{the objection} ~~It~~ is sometimes ^{made} ~~objected~~ to grains that they are a light ~~and~~ diet. Physicians commonly prescribe a farinaceous dietary during the early stages of convalescence from fevers and other ~~grave~~ maladies. That grains are a light diet is true only in the sense that they are easy of digestion. The lumberman loves fat pork because it "sticks by the rib," as he says,--which it actually does, ~~do,~~ remaining in the stomach for hours five or six ~~at least,~~ before digestion is complete. Boiled rice digests in one or two hours,--scarcely a quarter of the time required for the digestion of fat pork and ^{other} so-called "hearty foods." It is for this reason called "a light food", ~~but in no other sense~~ ~~can it be considered a light diet,~~ ^{yet} ^{really} for it is a highly nourishing ~~article of~~ food. The best authorities give its nutritive value as 37 per cent, while that of ~~the best beef~~ ^{beefsteak} is scarcely one third as great. Practically the same may be said of all the other grains.

The term "light diet" then means practically food which is highly nourishing and easy of digestion, while the so-called "hearty food" is food which is hard to digest, and of comparatively

acute

little value after digestion. It does not require very ~~practi-~~
~~cal~~ reasoning to reach the conclusion that the so-called "light
diet" which is conceded to be necessary for the sick is equally
advantageous for the well.

Preparation of Foods. —

We cannot dismiss this portion of our subject without a
word further in reference to the preparation of grains for food.

~~gerds corn, oats, rye, and other grains.~~ At *B* may be seen the large
starch cells filled with granules of starch, which constitute almost the
entire interior of the grain. It is this
fine white starch of which nearly all
superfine white flour is almost exclu-
sively composed. Especially "family
brands," made by either the old or
the new process.

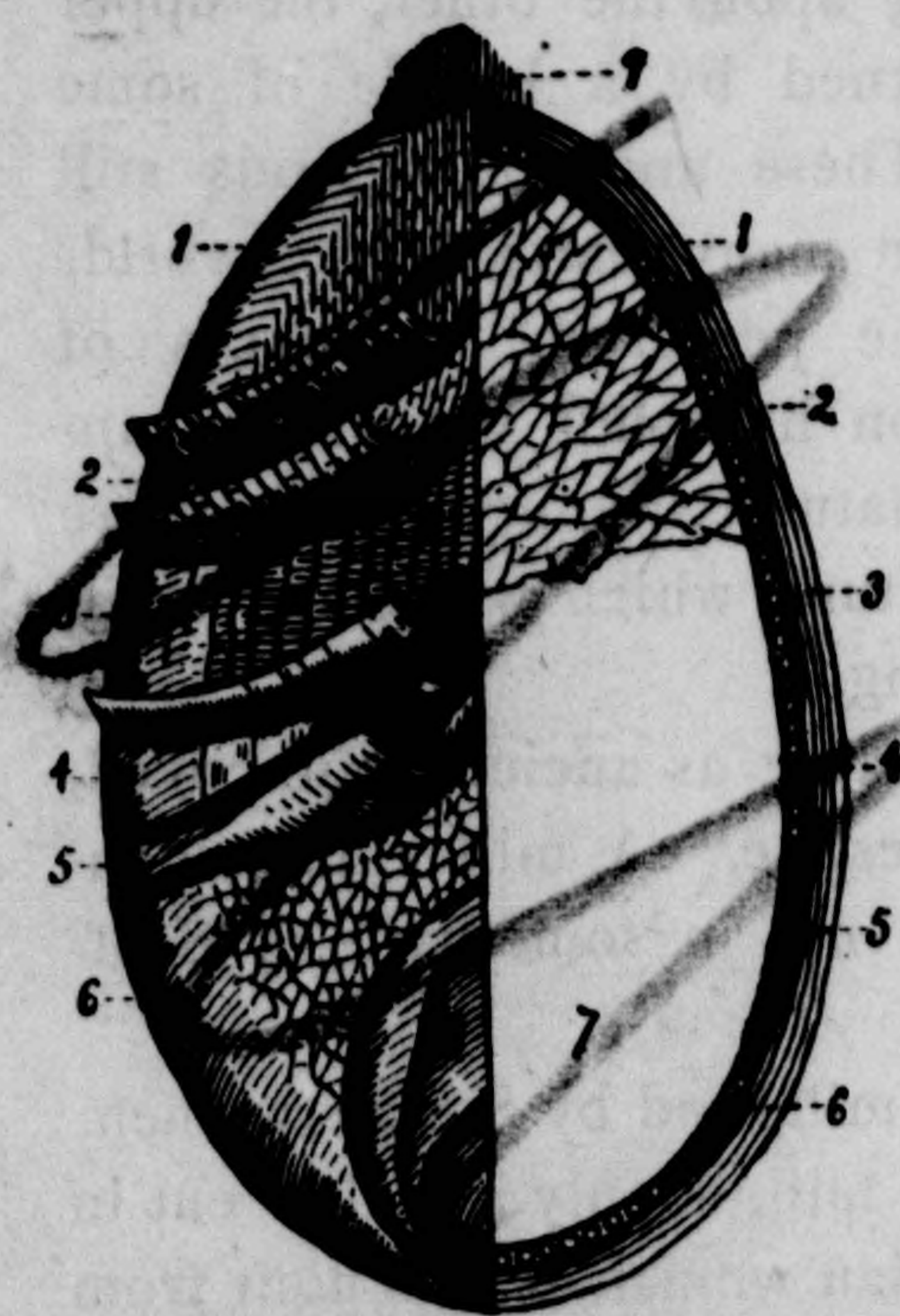


FIG. 3. The Different Layers of Grain.

~~The Modern Miller.~~ The aim of
the modern miller has been to make
his flour as white and fine as possible,
regardless of any question relating to
health. The consequence has been the
continued invention of various kinds
of machinery by means of which this
might be accomplished the more per-
fectly, until superfine flour has come
to be almost nothing but pure starch,
which, ~~as we have already stated,~~ is

incapable of sustaining life. In recent years, some improvements
have been made, in the employment of what is known as the "roller
process;" but the effect of this method is simply to make two grades
of fine flour, one of which is
a little better than the old
style, the other still poorer
in the indispensable, flesh-
forming gluten. For a gen-
eration at least, the farmer
has been feeding to his do-
mestic animals the richest
part of his grain, while ~~him-~~
~~self~~ and his ~~children~~ *family* are try-
ing to subsist upon the im-
poorished diet found in the
residue of starch which ~~re-~~
~~sults from~~ the bolting process. Let us glance for a moment at the
process employed by—

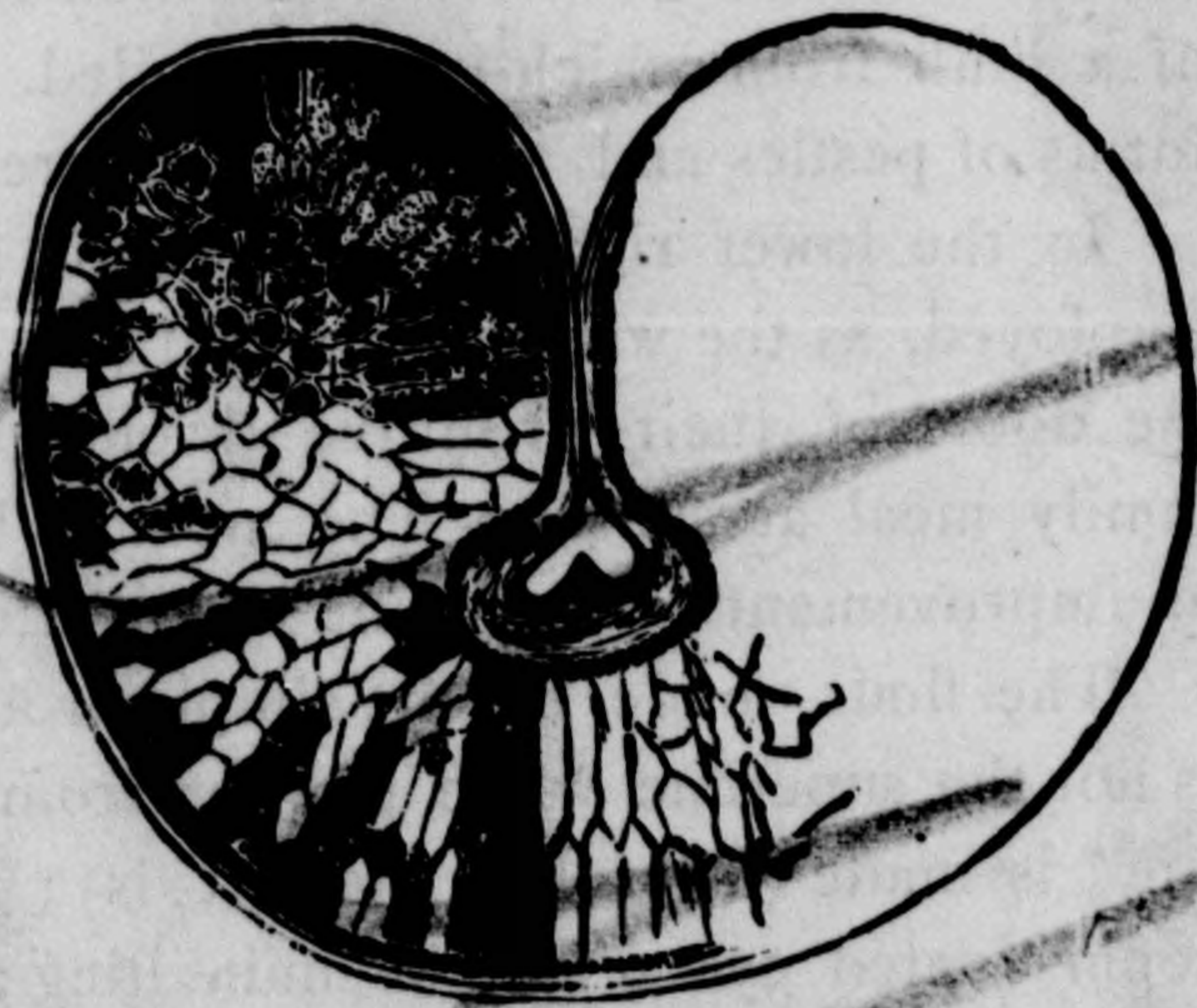
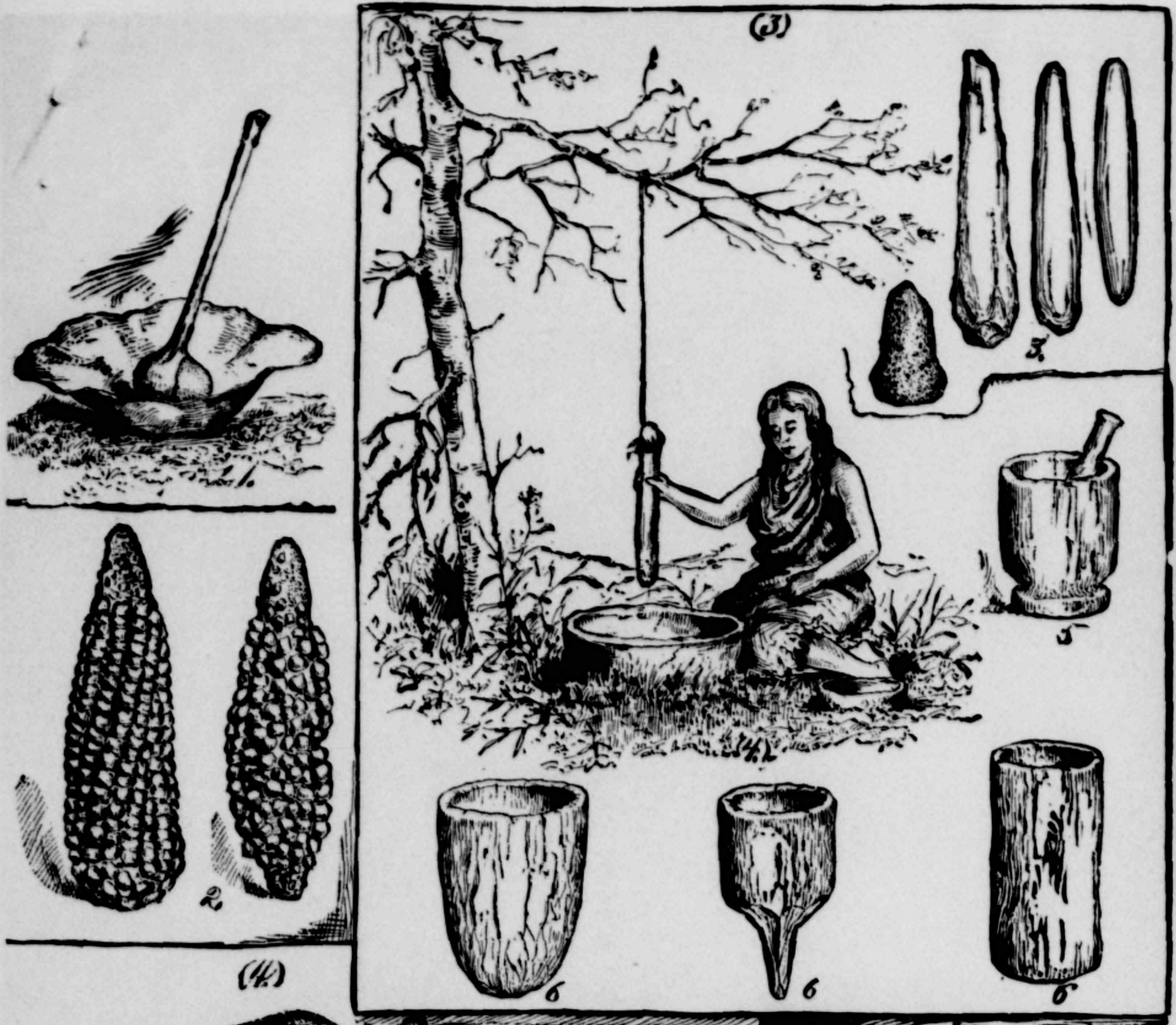


FIG. 4. Cross Section.

~~The Ancient Miller.~~— In olden times, grain was ground by the

furnished by

left after



SOME ANCIENT MILLERS.



FIG. 7. A Syrian Mill.

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PAUL PAGUIR, M. D.,
EDITOR.
V. H. KELLOGG, M. D.,
EDITOR.

SANITARIUM HEALTH FOODS.



most simple and primitive means,—
a mortar and pestle, or two stones,
one lying upon the other, the upper
being turned by a handle of some
sort. These ancient methods still
survive in many parts of the world,
where the perverting influences of
civilization have not yet wholly sup-
planted natural simplicity. Here are
a few pictures which will serve to il-

lustrate these primitive methods of milling.

FIG. 6 shows the process of flour-making as anciently practiced,
and still employed by the women of Palestine. A mill almost iden-
tical with that shown in ~~Fig. 6~~ is still in use in some parts of Scot-
land.

FIG. 7 is an improved form of hand-mill used by Syrian women.

FIG. 8 shows a most primitive sort of mill, simply a hollow cut in
the side of a log, in which the Pima Indian woman makes flour from
the screw-bean, the chief food of her family.

Fig. 9 is the stone slab, or metate (~~pronounced me-ta-te~~) on
which the Mexican woman grinds the meal to a finer consistency.

~~The following page shows an Indian woman at work with a more
convenient kind of mortar, in which the pestle is lifted by the swing
of a limb from which it is suspended. The cut also shows various
forms of pestles and mortars which are thus employed.~~

In the lower right hand corner is an Indian woman of Arizona
employed, as the writer has seen these simple children of nature, in
the doors of their primitive dwellings, grinding the grain for the
family meal at sunset. ~~The metates here shown are something of
an improvement over the one represented in Fig. 9.~~

The flour made by the simple processes of the ancient miller
is not the superfine white powder from which the modern "staff of
life" is made (a broken staff it is); it is dark, coarse, and to a
sophisticated eye might be uninviting; but it is sweet, and wonder-
fully nourishing and satisfying, as the writer can testify from personal
experience. It contains all the elements of nutrition. Primitive
man does not rob himself of the Creator's choicest gifts by seeking to
improve ~~of~~ nature's

upon methods and provisions.



Fig. 8. An Indian Mill.



Fig. 9. A Metate.

cut

Plate

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THE BACTERIOLOGICAL WORLD AND MODERN MEDICINE



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Recognizing the vast evils growing out of the brain ~~and~~ nerve, ~~and~~ muscle and bone starvation to which the consumers of fine flour expose themselves, Sylvester Graham ~~many~~ years ago called attention to the advantages of using flour made from the whole grain, or wheat



FIG. 6. Women of Palestine Grinding Wheat.

meal. This eloquent apostle of dietetic reform made such an impression upon the public that whole-wheat flour came to be known as "Graham flour," and is now thus called in all parts of the civilized
known

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world. ~~Some years ago the writer, while spending a few weeks in~~

The sturdy peasantry of Germany, Austria, Switzerland, Italy, and other European countries, as well as those of Egypt, Turkey, and Palestine, have from times immemorial made use of bread made from meal consisting of the whole grain, ground in some simple manner without the separation of any portion of it. This coarse meal bread, and even the rye bread of Germany, which contains rather of an excess of woody matter, must be regarded as infinitely superior in brain and muscle-building qualities to the superfine flour bread which in recent years has been so generally introduced.

The Structure of a Grain of Wheat.

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In order to make clear the advantages of whole-grain preparations, let us

briefly consider the structure of a grain of wheat, and the character of its nutritive elements. The food value of wheat is due to the *gluten, starch, and salts* which it contains. The first of these important food elements is needed to repair the waste of tissue from brain, nerve, and muscle work. It is the only element which rebuilds the living tissues of the body. Starch is of service in keeping up the supply of animal heat, and as a source of energy. The salts, which are represented in the ashes left when wheat is burned, are chiefly needed to give firmness to the bones and other hard structures of the body.

Gluten is the only food element which alone is capable of sustaining life. Animals fed on starch die almost as soon as those deprived of all food. Bernard found that dogs fed on salts die sooner than those that have nothing at all to eat. It thus appears that gluten is the most important of all the food elements. It is the true *flesh-forming* element of the grain. The salts are the *bone-forming* element. The starch is the *heat-forming* element. Analysis shows that the flesh-forming and bone-forming elements, in other words, the gluten and the salts, are closely associated in the grain. Let us now study the structure of a grain of wheat, as shown by that marvelous revealer of nature's secrets, the microscope.



FIG. 1. A Grain of Wheat, Magnified.

FIG. 1 is an accurate representation of a grain of wheat when enlarged by a magnifying glass of moderate power. Notice the coarse lines upon its surface and the stiff hairs at one end.

bristles have been peeled off by an improved process of milling. This outer covering is simply a woody shell, which is wholly innutritious, and incloses the valuable food elements.



Fig. 2. Wheat with Outer Coat Removed.

FIG. 3 shows the several different layers of bran, or woody covering, each of which is turned up in succession, until the nutritious interior of the grain is exposed. In the ordinary process of milling, the last layers, or innermost coats of the bran, are ^{taken} off in such a rough manner that they carry away with them much of the most nourishing part of the grain.

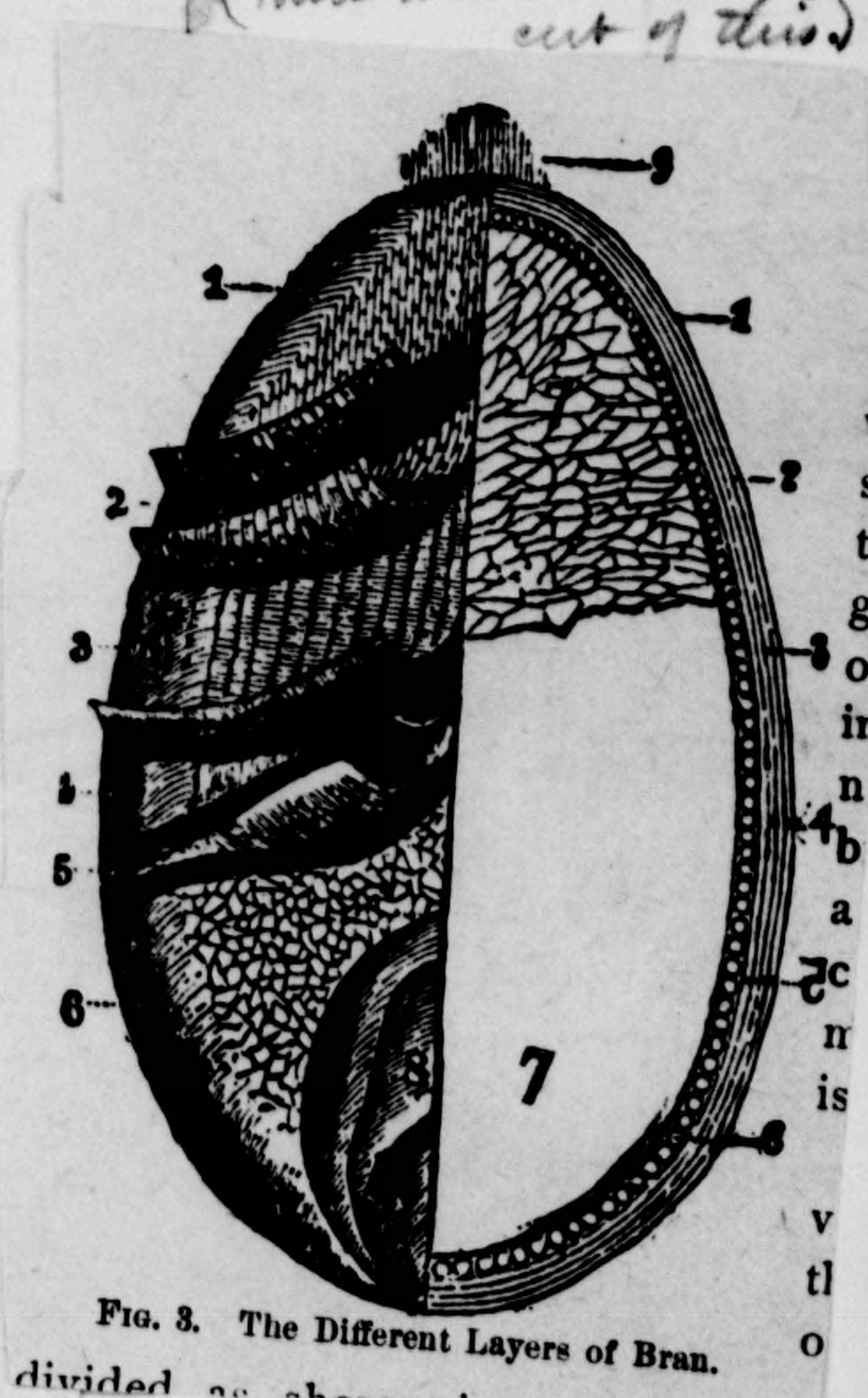


FIG. 3. The Different Layers of Bran.

FIG. 4 gives a magnified view of a cross section of a grain of wheat, which has been divided as shown in Fig. 2. Notice the numerous curious cells in which are found packed away in little parcels the starch and gluten of the grain.



FIG. 4. Cross Section.

FIG. 5 is a greatly magnified view of a small portion of a grain of wheat, including the inner layers of the bran. At A is shown the layer of gluten cells, which is found just next to the innermost layer of bran. Nearly all the gluten of the grain is found in this layer, together with the bone-forming salts. The same is true, also, as re-

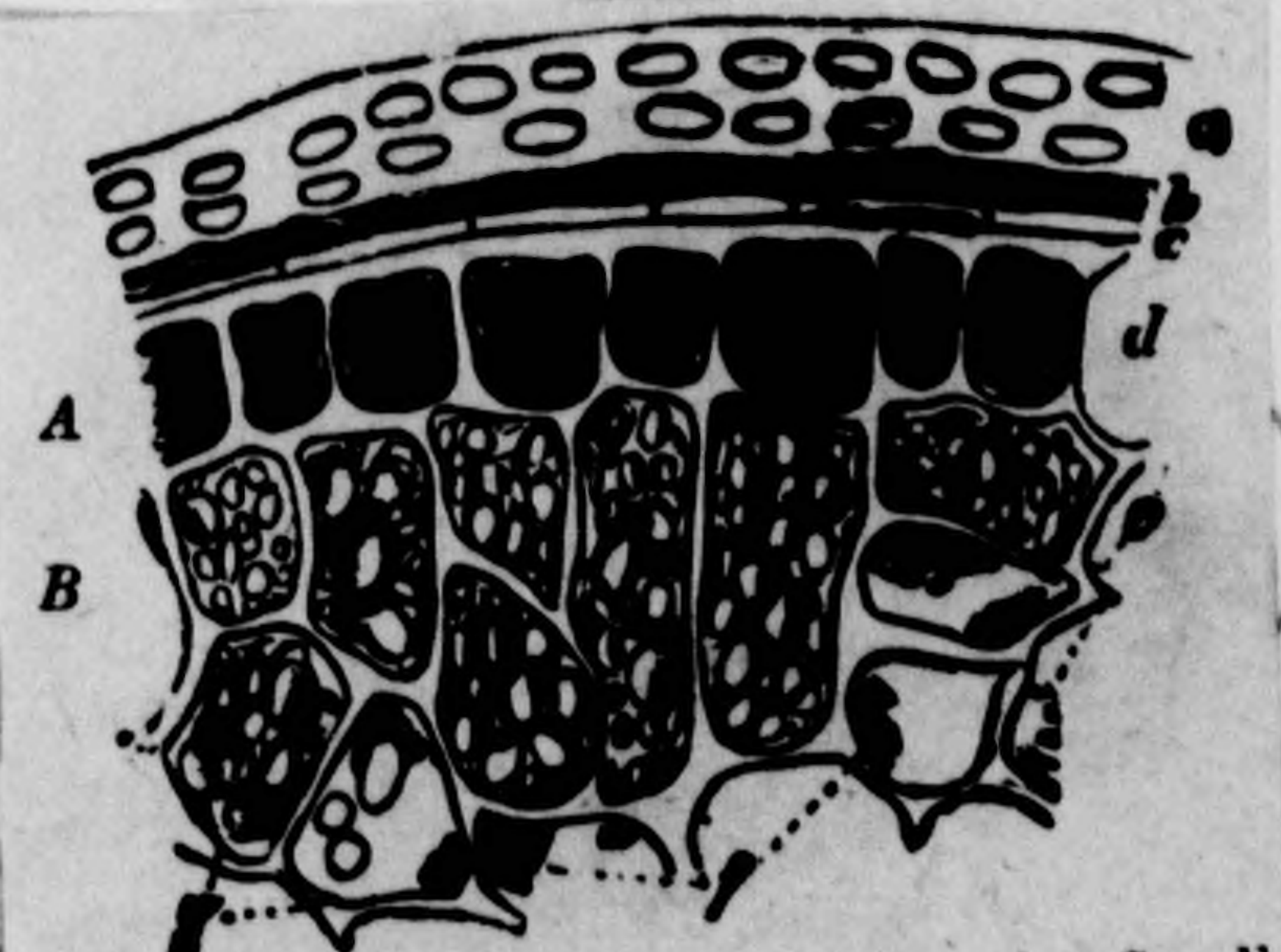


FIG. 5. Greatly Magnified View of a Small Portion of a Grain of Wheat.

gards corn, oats, rye, and other grains. At B may be seen the large starch cells filled with granules of starch, which constitute almost the entire interior of the grain. It is this fine wheat starch of which ~~nearly all~~ ^{chiefly} superfine white flour is ~~almost exclusively~~ composed. ~~Especially "family brands" made by either the old or the new process.~~

Graham flour, cracked wheat, oatmeal, and in fact all the whole-grain preparations, contain the elements of nutrition in just the right proportion to supply the wants of all the tissues of the body, making a perfect food.

For some persons, however, particularly certain classes of dyspeptics, ~~at least those~~ who complain of soreness at the stomach, it is better that the coarser portions of the bran, that is, the outermost layers, should be separated.

This is accomplished in what is known as "whole wheat" or "entire wheat" flour. It is from this highly perfected product of the improved methods of milling that most of the unequalled "Health Foods" herein described are made.



FIG. 7. A Syrian Mill.



FIG. 8. An Indian Mill.

from the finer part.
Shelled wheat flour.

varieties of

Numerous pulses are ^din use in India, China and Japan which are not known in this country. One of the most important of these is dahl, a woody shrub extensively grown in India. Poput and gram are other varieties of India pulse.

~~The Copeland Handbook~~

LEGUMES.--Under this head are included all seeds of pod-bearing plants, comprising all the varieties of peas, beans, and lentils. These are among the most valuable of ~~all~~ vegetable products, being easy of digestion, and containing a large proportion of blood- and tissue-building elements. Beans, for example, contain ³⁴30 per cent. of vegetable casing and albumin, which is more than the total nutritive value of the best lean beef. ~~in~~ In other words, a pound of beans contains more beef-steak than a pound of beefsteak. In addition, beans, as well as other legumes, contain a ~~very~~ considerable amount of fat, although this element is ~~not~~ less abundant in legumes than in oatmeal and corn, which are especially rich in ^{most varieties of} ~~this~~ ^{it.} element. Persons who have been accustomed to a meat diet, in ~~xxx~~ discontinuing it, should make abundant use of legumes.

the Soja bean, and similar seeds
 Lentils, ~~and analogous seeds~~ are much used by all except the ^{and to some extent in Germany,} very poorest classes in India, China, and Japan, and form a true dietetic complement to rice, ^{sometimes slightly} which is deficient in albumin, a necessary blood- and tissue-forming element. ^{The Soja bean is an excellent food for diabetic patients.}

VEGETABLES.--Foods of vegetable origin are ^{all} termed vegetables, with the exception of those which consist of the seeds or the seed-bearing portion of the plant. All the different parts of the plant are used as food, as illustrated by the turnip, a root; ~~the~~ asparagus, a stem; the cabbage, a bud; greens of various sort, the leaves; celery, a leaf-stalk; the potato, an under-

The Soja bean, as usually used in China and Japan, is all of the most nutritious of all vegetables, and is much used in Germany, and forms a true dietetic complement to rice.

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ground stem or tuber; and the cauliflower, a bunch of flowers or buds. Unripe peas and beans ~~in the pod~~, -- so-called ~~string~~ *green*

~~beans~~ ^{peas and beans, —} are also termed vegetables. In Mexico and some other

tropical countries, the branching stems of the cactus are sometimes employed as food.

Vegetables, however, without exception, are much inferior to grains in nutritive value. Most nutritious of all ~~of our~~ *the*

common vegetables is ~~our~~ ^{the} sweet potato, which possesses a nutri-

tive value of 31.6 per cent.; ^{this is} scarcely more than one third the

value of lentils, rice, and other ^{however.} seeds. Certain vegetables,

as the ~~savage~~ cabbage, have an exceedingly small nutritive value,

^{which has} less than 6 per cent. Fifteen pounds of cabbage will be required

to equal one pound of rice in nutritive value. The common Irish

potato, though less nutritious than the sweet potato, is for

most persons more digestible, and is more than four times as

~~valuable for the purposes of nutrition as~~ ^{is} ~~the~~ cabbage.

Starchy vegetables are much more difficult of digestion than grains, probably for the reason that vegetables contain a much larger proportion of woody structure, so that the starch is less accessible to the digestive fluids. For the reasons stated, per-

sons whose stomachs are dilated or who have so-called "weak stom-
achs," generally find it advantageous to exclude vegetables, at

least all except the more wholesome and easily digested ~~vege-~~ ^{varieties,}

~~tables~~ from their dietary. ^{the} Potato, asparagus, green peas, and the

Starch of roots
potash of potatoes

cauliflower are the most wholesome and nourishing foods of this class.

In various countries, as for example, in the Southern part of the United States, in Mexico, portions of Africa, and other tropical and sub-tropical regions, a very ^{palatable} ~~tasty~~ and nutritious vegetable food is found in the terminal bud of certain varieties of palm trees. There are doubtless many wild plants which might render useful service as vegetable foods if their properties were known. It is quite possible ^{that} many useful lessons may be learned from the wild natives of uncivilized lands.

Certain vegetables are of very doubtful value. ~~This remark applies especially to the onion and the rhubarb.~~ ^{The onion is an example of this kind.} If cooked until entirely free from its essential oil, the onion ~~must be~~ ^{is fairly} ~~regarded as~~ a nutritious article of food, although it is certainly inferior to many other ^s ~~foods~~ which may be ~~very~~ readily substituted for it.

Unwholesome Vegetables. —

~~Star under vegetables (p. 104-5.)~~ + p. 106

Some vegetables quite commonly used, ought to be wholly discarded. Among these should be mentioned the ordinary radish, the horseradish, and the rhubarb, or pie-plant. Radishes contain an acrid, irritating oil, and, being taken raw, ^{are practically indigestible,} as well as irritating.

Rhubarb contains a poisonous substance, oxalic acid, ^{which} ~~This acid~~ completely paralyzes the action of the saliva upon the starch, even when taken in very small proportion.

~~In a series of experiments with this acid~~
the writer found that the action of the saliva was wholly suspended by ^{so small} a proportion of oxalic acid as one part to ten thousand.

HEALTH FOODS.*--The general prevalence of indigestion in civilized lands has given rise to a special class of foods known as Health Foods. For more than twenty ^{five} years the ^{author} ~~writer~~ has been interested in the study of foods and dietetics, and has devoted much time to laboratory experiments and investigations in relation to the value of various ~~a~~ foods and the preparation of foods in such a way as to facilitate their digestion. The following is a brief description of some of the most valuable products which have resulted from these researches:—

GLUTEN PREPARATIONS. — For a certain class of persons, particularly diabetics and persons suffering from extreme nervous exhaustion, with inability to digest starch, gluten wheat constitutes a most excellent food preparation. The gluten is separated from the wheat by washing out the starch, the gluten remaining behind. When properly prepared, it is very palatable and exceedingly digestible. A recently devised preparation of gluten which is adapted to all classes of invalids, with the exception of diabetics, is known as Malted Gluten, the starch which has been removed in the separation of the gluten being replaced by starch which has been ~~replaced~~ digested by means of vegetable diastase.

* The Health Foods here described are manufactured by the Battle Creek Sanitarium Health Food Co., Battle Creek, Mich., U.S.A. Most of these foods are ^{also} now manufactured at the Institute Sanitaire, Basil, Switzerland, from which supplies can be obtained.

Footnote

ANIMAL FOODS.--Animal foods are generally classed as flesh, fish, fowl, eggs, and milk. The most common forms of so-called flesh food are beef, pork, mutton, and wild game. Of these, most beef is the ~~best~~ digestible. Pork is difficult of digestion, and perhaps the most objectionable of all forms of ^{flesh} animal food.

In the use of animal foods of all ^{kinds} ~~sorts~~, especially flesh food, far greater risk is run of infection by disease from which the animals themselves may have been suffering, than in the use of vegetable food. Animals are frequently subject to living para-

Granola, a thoroughly cooked, baked, and coarsely ground cereal product, prepared from the choicest grains, and by the process of preparation rendered easily assimilable by persons suffering from inability to digest starch. The nutritive value of granola, as shown by chemical analysis, is 95. Granola is especially adapted for use by travelers, elderly people, children, and persons having dilated stomachs.

Granose, a preparation from the choicest wheat, consisting of the whole berry rendered absolutely free from every particle of dirt by the most thorough cleansing, brushing, scouring, and washing, and prepared for digestion by prolonged and thorough cooking by both moist and dry heat, and a preliminary digestive process whereby the starch is converted into dextrine. The outer covering of the grain, although preserved, is thoroughly disintegrated. This fact renders granose a most valuable food remedy for constipation, in which it has no equal. In the process of manufacture the berry is spread out into large, thin flakes, which are as crisp and delicate in flavor as the most fastidious appetite could require. Granose is a favorite wherever it has been introduced, as it is a food which is absolutely unique and unequalled. It is often readily digested by persons who cannot digest any other food, which is doubtless in part due to the fact that it is relished when other foods are not.

Caramel-Cereal. ^{This preparation is intended as} A substitute for coffee. The well-known effects of tea and coffee in provoking indigestion and special nervous disorders in certain susceptible persons has created a demand for a wholesome substitute. This is offered in caramel-cereal, a product which has been tested for this purpose for a number of years in various sanitariums, and by thousands of persons who have found tea and coffee injurious. Caramel-cereal is an agreeable beverage and a stomachic tonic.

Crystal Wheat is a preparation of wheat in which the entire kernel is preserved, the grain having been subjected only to processes of thorough cleaning, without the removal of any portion of the bran, or the sacrifice of any of its nutritive elements. In the process of manufacture the grain is exposed to a cooking heat for several hours, so that it is thoroughly cooked.

per cent

very

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Flesh food not a natural diet for man. 206

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sites, and suffer more or less from many of the same diseases to which human beings are subject.

That the flesh of animals is not the natural diet of man was very earnestly argued by the author of Plutarch's Lives, one of the most eminent writers of antiquity, ^{and the pupil of} ~~who was taught by~~ Pythagoras, ^{an} ~~the~~ eminent Grecian philosopher ^{who lived} several hundred years before Christ. Buddha, ^{great} the reformer of the Brahmin religion, taught vegetarianism even before Pythagoras, and the results of his teaching are still to be seen in 200,000,000 ~~the~~ vegetarians and the Hindus in India, Millions of ~~the~~ vegetarians natives of Burmah, Siam, China and Japan.

Linneus, the ^{famous Swedish} ~~great~~ naturalist, in speaking of man's dietetic character, remarked, "His organization, when compared with that of other animals, shows that fruits and esculent vegetables constitute his most suitable food."

Baron. Cuvier, one of the most remarkable scientists of all time, ^{and} the father of the science of "Comparative Anatomy," said,

"The natural food of man, then, judging from his structure, appears to consist of fruits, roots, and esculent parts of vegetables."

Sir Everard Home, an eminent English naturalist, said that "while mankind remained in a state of innocence, there is every reason to believe that their only food was the production of the vegetable kingdom."

Mr. Thomas Bell, Professor of Anatomy in Guy's Hospital,

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declared that
London, Eng., ~~stated~~, "Every fact connected with human organization goes to prove that man was formed a frugivorous animal."

In the first chapter of Genesis the Creator gave to man his bill of fare in the following words: "Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat." (Gen. 1 : 29.)

It is a notable
The interesting fact that with the beginning of flesh-eating after the flood began also the state of war and enmity which has since existed between human beings and the animal creation. That the animals preserved in the ark with Noah were non-carnivorous in their habits is evidenced by the instructions given to Noah respecting provisions for their sustenance. When Noah was given permission to make use of the flesh of animals as food, after the Flood, at the same time animals were given permission to take the life of man : "And the fear of you and the dread of you shall be upon every beast of the earth, and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes of the sea ; into your hand are they delivered.... And surely your blood of your lives will I require; at the hand of every beast will I require it, ~~and at the hand of man; at the hand of every man's brother will I~~ require the life of man." (Gen. 9 : 2, 5.) The inspired prophet

Isaiah, looking forward to a time when the Edenic state should be restored, declares, "The wolf also shall dwell with the lamb, and

the leopard shall lie down with the kid; and the calf and the young lion and the fatling together, and a little child shall lead them;.

And the cow and the bear shall feed; their young ones shall lie down together; and the lion shall eat straw like the ox. (Is. 11. :6, 7.)

From ~~which~~ ^{this} we may judge that the ferocity of carnivorous animals may be properly ~~attributed~~ ^{ed} to their dietary.

That meat is not essential as an article of diet is clearly shown by the testimonies of many eminent men. Said Dr. Carpenter, the eminent English physiologist, "A ~~whole~~ ^{properly} selected vegetable diet is capable of producing the highest physical development."

~~Says~~ Dr. Parkes, ^{the well-known} ~~an eminent~~ English ^{says,} ~~sanitarian,~~ "The well-fed vegetable-eater will show, when in training, no inferiority to the meat-eater."

~~Says~~ Dr. Edward Smith, the English authority on food and dietetics, ^{states that} "Every element, whether mineral or organic, which ~~is~~ required for nutrition is found in the vegetable kingdom." A host of similar testimony [!] might be adduced.

That a flesh diet is less wholesome than ~~a diet~~ ^{one} which ~~excludes~~ ^{entirely} the flesh of animals ~~of any sort~~ may be clearly shown by a multitude of physiological and experimental facts. ~~We will adduce only a few, which the reader, we trust, will find well worthy of consideration:~~ ^{The few here will, it is thought, be found} ^{by the reader}

1. Under the most favorable conditions, the flesh of animals contains poisonous substances which are more or less injurious

Vegetable Diet + Inferior.

when introduced ⁱⁿ into the human body, and which tax the liver and kidneys ^{severely} for their elimination. Every animal is a factory of poisons.

During the life of an animal these poisons are rapidly eliminated through the lungs, liver, kidneys, and other excretory organs. The constant and rapid removal of these poisons of the body is as necessary for the maintenance of life as the rapid and continuous removal of the smoke and gases resulting from combustion of fuel in a stove in which a fire is burning. ~~When an animal dies,~~ these poisons continue to form for some time, ^{after the death of an animal} for the vital fires in the tissues are not extinguished instantly, ^{when} although the heart, lungs, and other vital machinery cease their activity. The consequence is, that even the flesh of a healthy animal contains, in much more than an ordinary amount, the tissue poisons which are constantly present in all living animals.

Food Poisons

When meat is eaten, these poisons must be carried out of the body through the liver, kidneys, and other ^{excretory} organs, the same as these ^{poisons} developed within the body. While the liver and kidneys ^{may be} able to do this in a healthy person, they are less able to do so in certain forms of disease, as in ^{severe cases of} ~~excessive~~ fever when both liver and kidneys are taxed to the utmost to maintain a sufficient degree of purity of blood and tissue to permit the continuance of the life-processes until the special source of poisoning has been removed; in biliousness, in which an excess of poisons is produced in the stomach, and ^{so} overwhelm the system so that any additional contri-

are absorbed into the system,

naturally

bution of poisonous matters may result disastrously; in Bright's disease, and ^{also in} some forms of liver disease in which the ability of the system to cope with poisons and to remove them is greatly diminished. *H* In view of these facts, it is evident, *that,* -

1. ~~That although~~ ^{While} it is possible for a healthy person to make use of the flesh of animals as food, there must be a constant and positive disadvantage in so doing, ^{from} in the fact that the liver and kidneys and other poison-destroying and eliminating organs ~~are~~ ^{are being} required to do more work than is naturally required of them, the result ~~of which~~ must certainly be premature decay and failure.

2. The frequency with which ~~the flesh of~~ ^{are} animals ~~is~~ diseased ^{so} that their tissues contain not only ordinary poisons but special poisons resulting from disease, ~~and~~ which may give rise to similar diseases in the eaters of such diseased flesh, has already been referred to.

^{Consumption from Flesh-Eating.}
Consumption is doubtless very frequently communicated in this way. In many countries the ^{men} government has appointed ~~inspectors~~ whose duty it is to carefully examine the animals slaughtered for ~~human consumption~~ ^{to food}; and the reports of these inspectors show that many thousands of animals are annually condemned in consequence of the ~~presence~~ ^{evidences} of ~~consumption~~ ^{tuberculosis or} and other maladies dangerous to human life. Several cases of consumption have been recently reported in which this disease began in the throat, evidently ^{as} the result of infection from eating tuberculous flesh.

~~Another fact worthy of attention, is, that but a small propor-~~

become infected.

^

In Fig. ... is presented a highly magnified view of a trichin-
~~is as found in the flesh of pork.~~ The drawing was made from ~~the~~ ^{specimen}

~~specimen~~ ^{parasites} found by the author in the examination of a piece of pork

the eating of which ^{had given} ~~gave~~ rise to an outbreak of trichinosis in a ^{family}

^{in a} small town in Wisconsin. The ~~case~~ ^{(U.S.A.) disease} was supposed to be ~~one of~~ rheu-

matism by the attending physicians, but a neighbor, suspecting the

real cause, obtained from the family pork-barrel a piece of the

pork of which the family were eating, and sent it to ^{the author} us for exam-

ination. Strange to say, the family still persisted ^{in using the pork,} and would

not be persuaded that it was in any way connected with their suffer-

ings. ^{Hogs} in some way, derive the trichiniae from their food,

either by eating other hogs which have died of ~~the~~ disease, or rats

which, ^{by} ~~through~~ visiting cemeteries and dead houses, and eating offal,

are very likely to become infected with ^{this parasite} trichiniae. Thus man forms

a partnership with lower animals in the propagation and dissemi-

nation of parasitic diseases. A man dies of trichinosis; a rat

eats the man; a hog eats the rat, and another man eats the hog,

^{and} Thus ~~one scavenger eats another and passes the disease, and~~ ^{is passed along}

~~By the disease of meat as food this dangerous partnership ceases~~ ^{is entirely done away with.}

~~to exist.~~ Tape-worm and trichiniae ^{infection} poisoning ~~as found~~ in human

beings would at once disappear ^{were} with the ~~discontinuance~~ of the use

of meat ^{discontinued.}

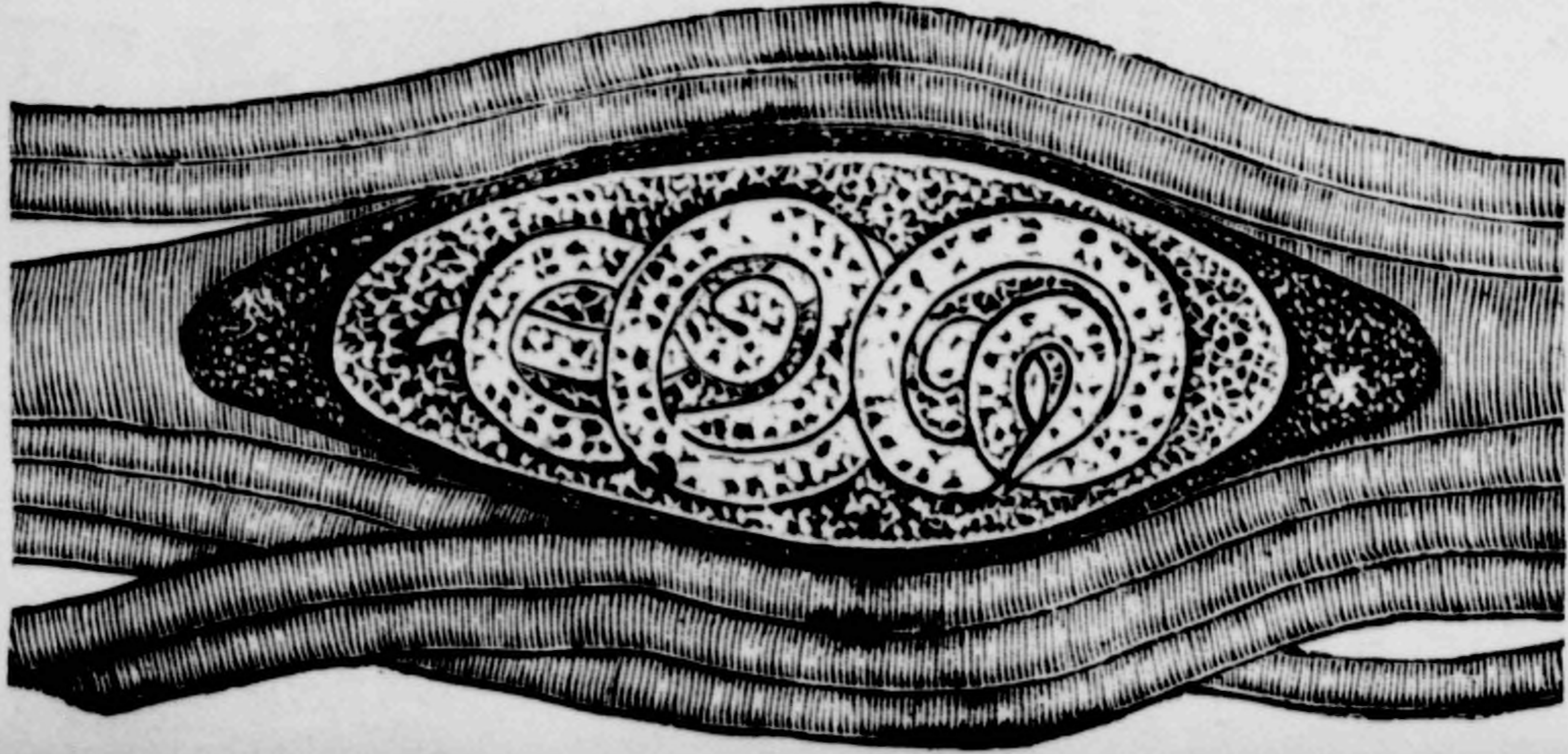


Fig. 156. Trichinae—Two in a single Capsule. Highly Magnified.



Pork

Fig. 155. Measly Pork containing Young Tape-Worms.

tion of nitrogenous matter, such as is represented in lean meat, can be used by the body, and when in excess, must be at once discharged from the body, as in the form of excretions. In other words when the flesh of a dead animal is taken into the system, that portion that does not immediately assimilate, must be treated as so much dead tissue derived from the individual's own body.

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Tape-worm from flesh eating.

This subject ~~is one which~~ is receiving much attention from sanitarians in all parts of the civilized world, and is unquestionably worthy of all the consideration given to it.

Many forms of parasitic disease, especially tape-worm and trichinae, result from the use of diseased flesh.

Tape-worm is almost invariably derived from beef; Trichininae, which gives rise to a very fatal disease, is derived from pork. Fig. ... shows the head and a section of a tape-worm. These creatures sometimes grow to ^{a length of} many yards ~~in~~ ^{are} length. ~~The author has removed a number of these parasites, which were evidently derived from the use of beef.~~

Fig. ... shows the appearance of meat commonly known as "measly beef," in which the mebro tape-worms are present. They are enclosed in little sacs, from which they are liberated by the digestive fluids. They fix themselves to the mucous membrane of the intestine, and continue to grow indefinitely, ^{daily} throwing off ~~daily~~ millions of eggs, each of which is capable of giving rise to similar embryos in the flesh of some other animal. These eggs find their way into the streams and pools from which animals drink, and thus

low

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* A surplus of carbonaceous elements in the form of starch, fat, or sugar, is stored as fat; but there is no provision for the storage of any surplus of proteid elements in the body, so they must be excreted.

Meat-Eating Over-works the Kidneys.

As there is no provision for the storage of surplus of protein elements surplus of carbonaceous elements in the form of starch, fat or sugar, is stored as fat; but surplus albumen must be excreted.

3. Another fact worthy of attention is, that but a small proportion of nitrogenous matter such as is represented in lean meat, can be used by the ^{system} ~~body~~, and, when ^{taken} in excess, ^{it} must ~~be~~ at once ^{be} discharged from the body ~~and~~ in the form of excretions. In other words, when the flesh of a dead animal is taken into the system, that portion ^{which is} ~~that~~ does not immediately assimilate ^d must be treated as so much dead tissue derived from the individual's own body. Investigations of M. Germaine See, an eminent French physician, have shown that only about one tenth of the entire amount of food required by a human being daily should consist of albumin or its equivalent; in other words, about two, or two and one-third ^{or day} ounces is the total amount of ^{this class of} ~~these~~ food-elements which can be assimilated or utilized. Any excess ^{above this} ~~must be treated as so much excretory substance~~ and acts like ~~poison~~ ^{poison} in the body. *

Lehmann, the eminent German chemist, many years ago found that in a person subsisting upon a flesh diet, the amount of poisonous matters eliminated by the kidneys through the urine was two and one-half times as great as that ordinarily eliminated; in other words, the kidneys were obliged to do two and one-half times as much work in the case of a man ^{who} ~~subsisting~~ ^{ed} upon a meat diet as in the case of ^{one} ~~a man~~ subsisting upon a natural diet of fruits, grains, etc. The ^{author} ~~writer~~, in a similar experiment, found the kidneys compelled to do four times the amount of work required in health; and the toxicity of the urine ^{proved} ~~was, by actual experiment,~~ by in-

and amount of the material excreted.

~~Explain further~~ 213
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^{urine}jecting ~~nitrogenous matter~~ into the veins of a rabbit, ^{was} shown to be four times as great as the normal. Since, as has already been ^{stated,} ~~shown~~ all the grains, with the exception of rice, contain an ample proportion of the nitrogenous elements, it is evident that if a person takes a mixed diet, consisting, for example, of grains and meat, he is certain to take ^{an} ~~some~~ excess of the nitrogenous element ~~in the~~ ~~form of meat,~~ ^{and} so that the kidneys are overworked just to the extent of the excess. Lehmann observed that ^{with} in a mixed diet, the kidneys ^{are} ~~were~~ obliged to do one-half more work than on a ~~natural~~ diet ^{entirely} excluding flesh.

4. A meat diet is excessively stimulating to the stomach, and large meat-eaters sooner or later suffer from hyperpepsia, a disease in which an excess of hydrochloric acid is produced. Such persons, on discontinuing the use of meat, often suffer some inconvenience, for the reason that meat not only excites an excessive secretion of hydrochloric acid, but at the same time neutralizes the acid to some degree, so that the patient experiences less discomfort ^{in its use} than ~~from~~ ⁱⁿ taking other foods. The habitual use of a bland and non-flesh diet, however, soon enables the stomach to recover its normal condition.

5. Another objection to the use of meat is the fact that it so readily undergoes decomposition in the stomach and intestines.

The excessively fetid character of the fecal matters of a carnivorous animal, ~~like~~ ^{the} dog, for example, as compared with the discharges of a vegetable-eating animal, as a sheep or a rabbit, is an indica-

Meat an injurious Stimulant.
Gives Rise to
Poisons in the Stomach.

tion of this fact. An examination of the fecal matters of carnivorous animals, made by Bouchard, demonstrated the presence of an excessive amount of extremely poisonous substances resulting from the action of germs upon the meat in the alimentary canal.

The most dangerous germs thrive upon meat, or in meat juices. The bacteriologist always ^{selects} the extract of beef or some similar substance for the Propagation of ~~disease~~ germs; in fact it has been found that many disease germs when growing upon vegetable substances or ⁱⁿ ~~and~~ vegetable juice, do not give rise to the same poisonous substances which characterize them when grown upon meat or in meat juices.

This agrees with ^{the} interesting observations recently made by Gautier, ~~an eminent~~ ^{the noted} French chemist, in the course of a series of experiments which demonstrated that the germs of scarlet fever, diphtheria, and other infectious diseases produce the deadly poisons by which they affect the system, and which give rise to the principal symptoms of these diseases, not from normal blood and normal tissues, but from the excretions or waste matters of the body, the very same as those which are found in ^{all} flesh.

From these facts, it is evident that a person who subsists in whole or in part upon a meat diet, is constantly exposed to sources of meat-poisoning ~~to~~ which a person subsisting upon a non-flesh diet ^{escapes,} ~~is not exposed.~~ This is ^{proved} ~~made evident~~ by observing the wide difference existing between an apple, a potato, a bit of bread or ~~of~~ any other vegetable food, when exposed to a moderate

degree of warmth and moisture for a week or two, and meat of any sort, whether fish, flesh, or fowl, when placed under the same conditions. Vegetable food might present an aspect of mold, fermentation, or even decay, ^{it} but would be comparatively innocuous and inoffensive in contrast with the horribly putrescent ~~and loathsome~~ ~~condition presented by the~~ ^{and} decaying flesh.

what is being
 that is available to
 Letheby

(50) The strongest and the longest-lived animals, as the elephant, the bison, the camel, the horse, the hippopotamus, ^{and} the rhinoceros, are ~~all~~ ^{Siamese} vegetable-eating animals. The largest, the strongest, the longest-lived, ^{and} the healthiest human beings are ~~practical~~ vegetarians. But a small proportion of the human race use flesh food to any extent. The Hindoos, ^{the} Chinese, ^{the} Japanese, the Siamese, the Brahmans, the Indians of South America, ^{and} the natives of large territories in Africa are practically vegetarians. Letheby tells us that the average Irishman eats less meat in one week than the average Englishman eats in a day. The same is true of the Scotch ~~peasant~~. The peasantry in England as well as in Ireland and Scotland ^{use very little} ~~rarely taste~~ ^{as food} of flesh.

Dr. Burney Yeo, of King's College, London, looked up the habits of (45) centenarians, and found ^{that} a number of them had never eaten meat or fish; Ten had used it moderately; only one had used it freely; the majority had only tasted it occasionally. The famous Trappist monks, who have founded institutions in different parts of Europe and the United States, are vegetarians, as are al-

so the Carmelite sisters. These people live to a very great age and ~~they~~ are practically free from the infirmities of advanced years. The abbot of one of these ^{institutions} ~~establishments~~ stated in a letter to the author a few years ago that the vegetarian habits of the Trappist monks ^{are} ~~is~~ regarded by them as highly conducive to health; and that the members of the community are practically free from disease, ^{usually} ~~that~~ dying ^{only as} ~~is~~ the result of old age, notwithstanding the many hardships imposed by their mode of life.

The diet of the natives of Mexico and Central America, when discovered by the Spaniards, was almost entirely vegetable in character, being chiefly corn and other cereals, which ~~should~~ enable them, according to Pavy, the ^{noted} ~~eminent~~ English authority on diet, to attain ^{to a} very great ^{ages} ~~longevity~~. This would doubtless be ^{still} the case were it not for their general addiction to the use of alcoholic liquors.

When discovered, the natives of New Zealand, were found subsisting chiefly upon sweet potatoes, taro, ^{with} ~~and~~ a few berries, and other vegetables. Yams, plantains, and cocoanuts were the diet of the natives of the Friendly and other Pacific Islands.

At the Sandwich Islands, the ^{chief} ~~principal~~ diet of the natives has for unknown generations been poi, a sort of paste made from the ^{taro} ~~kalo~~, a water-plant. The Chinese subsist almost exclusively upon rice eaten twice a day ~~at 10 A.M. and 5 P.M.~~

Rice seasoned with a little salt or lemon juice is the ^{also} ~~pr~~-principal diet in Ceylon, and the use of beef is forbidden and con-

sidered an abomination. Dates constitute the chief sustenance for men, and women, children, horses and camels, in the oases of the Sahara Desert.

A porridge of corn and flour constitutes the staff of life *among* ~~of~~ the natives of East Africa, who take their food twice a day, morning and evening. Rice is also sometimes used by them, being boiled in cocoanut juice.

Livingstone found lotso meal and manioc combined with ground nuts a wholesome and wholly satisfactory diet in South Africa.

The Kaffer lives upon ^{sour} ~~sour~~ milk and millet, of which he eats one meal a day. ^{he} ~~The Kaffer~~ will never touch pork, considering it an abomination.

The South American Indian engaged in gathering the products of the rubber tree will travel from morning until night over mountains, ^{and dense} through thickets, carrying an immense and growing load upon his shoulders ^{while subsisting} upon a simple diet of bananas.

As regards the digestibility of meat, Pavy, the highest living authority upon dietetics, states: "Animal food certainly taxes the stomach more than the ordinary form of vegetable food which we consume, as is well known by those who have weak digestive powers."

Much more might be said upon this part of the subject, but we ^{lack of space forbids} ~~have not~~ space here ~~to enter into~~ the full argument in relation to vegetarianism; ^{the} ~~a~~ subject ^{is} ~~which we have~~ discussed at greater length elsewhere. ^{While it may sometimes} ~~If flesh food may be advantageously~~ employed

Flesh food is not necessary to sustain ~~either~~ mental or physical vigor, or animal heat. It contains no nutrient element not found in vegetables. ~~In fact, eating flesh is only taking vegetables at second hand, for all animals subsist upon a vegetable diet.~~

whose flesh is eaten

indeed, the very

Vigorous Vegetarians.— The Congo rail road is not yet completed, and the cataracts of this great river render transportation by water possible only to a certain distance; and, curiously enough, there are no beasts of burden in this part of the world. The only means of transport is the shoulders of men. The porters are, according to the *Century*, natives of the Bakongo tribe, inhabiting the cataract regions. In physique ~~these men~~ ^{they} are slight and only poorly developed; but the fact of their carrying on their heads from sixty to one hundred pounds' weight twenty miles a day, for sometimes six consecutive days, their only food being each day a little manioc root, an ear or two of maize, or a handful of peanuts, pronounces them at once as men of singularly sound stamina. Small boys of eight and nine years old are frequently met carrying loads of twenty-five pounds' weight. This observation agrees exactly with the reports of travelers concerning the great strength of the rice-eating coolies of China, the banana-eating natives of South America, the vegetarian Hin-

in certain parts of the world

Along the Upper Congo

does, and the barley-fed Turkish peasant. It comports also perfectly with the fact that the strongest members of the animal kingdom, among which must be mentioned the ox, elephant, and hippopotamos, are strict vegetarians. ~~Physiologists who make a scientific study of this question, are coming to recognize the fact that the flesh of animals is not necessary to the maintenance of the highest degree of health and physical vigor.~~

Vegetarian Athletes.— The bodyguard of the late Emperor William was made up of men of great physical power, averaging in height from six to six and one-half feet. These men were natives of a mountainous district in Germany in which little or no meat is used as an article of diet.

flesh as an article of diet when ~~under circumstances under which~~ ¹²⁰

~~under circumstances under which~~ other suitable food cannot be secured, it is certain that, under favorable circumstances, superior substitutes may be readily found, not only for persons in health, but ^{also} for the various conditions presented by disease ~~as well.~~

What has been said in reference to the uses of flesh food applies likewise to the use of fish, which ~~are~~ ^{is} simply an inferior form of flesh food. Fish, like other animals, suffer from disease, often dying in immense numbers ~~of~~ ^{from} epidemic maladies. ~~More than~~ ^{Not infrequently} ~~once~~ ^{or} general pestilence ~~has broken~~ ^{breaks} out among the inhabitants of seacoast regions in consequence of the decomposition of the ~~in~~ ~~large~~ quantities of dead fish thrown up ~~upon~~ the shore. ~~is~~ ^{of the flesh of} ~~are~~ somewhat less nourishing than ~~the flesh~~ ^{that} of mammals. After death, fish undergo decomposition with much greater rapidity than a warm-blooded animal. There is especial danger in using canned fish in consequence of this fact, ~~also in consequence~~ ^{on account} of the readiness with which decomposition takes place in the contents of the ~~a~~ can after it is opened. Even within a few hours ^{it} ~~as over~~ ~~night~~ ~~canned fish~~ ~~canned salmon~~ ~~for example~~ may become intensely poisonous. This is frequently the case when no taint of decomposition ~~can be~~ ^{is} discovered by ~~the~~ ^{either} senses of taste or ^{of} smell.

the hog.

there is

The hog is a scavenger by nature. His organization indicates it; for he has a regular system of sewers running all through his body and discharging on the inside of his fore-legs, the express object of which is to convey away the filth with which his body teems.

~~The process of fattening hogs is one of disease.~~
A fat hog is one which is grossly diseased. That this is the case is shown by the condition of the liver. ~~The livers of all fat hogs are masses of disease.~~ Experienced butchers assert that the livers of very fat hogs are extremely apt to be affected by abscesses.

~~Tape Worm~~ - This loathsome creature, which sometimes gets into the human stomach and intestines, and grows there to the enormous length of several rods, is communicated to man by eating pork. The occurrence of tape-worm is becoming much more frequent in this country than formerly.

~~Trichinae~~ - Still more to be dreaded by pork-eaters are the terrible trichinae, which are also

communicated by the eating of pork. Each worm is so small that several hundred thousand of them may occupy a single cubic inch of swine's flesh. When taken into the body, a single worm may produce a thousand young, which at once ~~commence~~ ^{begin} boring into the ~~body~~ ^{tissues} in every direction, lodging at last in the muscles. The pain and general disturbance of the system is so great that few constitutions can survive the terrible ordeal. If life is not destroyed at once, the individual lingers along, a constant sufferer, his body filled with disgusting worms for which there is no remedy. No cure for the disease has been discovered. About one hog in every ten is affected by the disease. No more than one in ten of the deaths from this cause are attributed to it, ~~as~~ ^{for} the disease may ~~appear like many~~ ^{resemble several} others, resembling cholera, dysentery, typhoid fever, cerebro-spinal meningitis, and rheumatism. ~~No pork is safe.~~ ^{or}

disorders / for as

~~It is well known to be a custom with butchers to salt the flesh of animals known to be tuberculous, selling the flesh after a few weeks. It is doubtless the supposition that in so doing the flesh is rendered wholesome by the death of the germs, which occasion this formidable disease in animals and human beings.~~ Recently, M. de Frey, an eminent French physician, has been making experiments for the purpose of determining the influence of salt upon germs of different kinds, and he finds that while salt will kill or render inert the germs of fermentation, and many other kinds of germs, the germs of consumption, as well as those of typhoid fever, are practically unaffected by it, and continue to flourish even in strong solutions of salt.

meat

and then wait a few weeks before tuberculous

SHELLFISH.—

Shellfish, including oysters, clams, lobsters, crabs, and shrimps, are ~~ranked~~ the most inferior form of ~~all~~ animal food. These creatures are all scavengers, feeding upon

the minutest organisms which thrive in the slimy ~~which covers~~ the stones and aquatic plants of the waters, which they live. 221

We quite agree with the sentiment of the ~~anonymous poet~~ ^{rhymester} who wrote:—

"That man must had a palate covered o'er
With brass or steel, who on the rocky shore
First broke the oozy oyster's pearly coat,
And risked the slimy morsel down his throat."

The fact that oysters are readily dissolved in the digestive fluid is not an evidence that should be accepted in their favor, as foods, for the reason that the most easily digestible foods are not by any means always the most wholesome.

Oysters as well as all other shellfish always contain more or less poisonous matters derived from the filth upon which they feed. In some instances these poisonous matters are present in so great a quantity as to give rise to dangerous or even fatal inflammation of the bowels. ⁹ The ~~habit~~ ^{eating} of oysters of ~~which~~ ^{which have been grown near} the mouths of sewers, ^{so they could} ~~and feeding~~ ^{which accumulate there,} upon the filth has more than once been the occasion of an outbreak of typhoid fever through ^{the} communication of these germs to human beings by the ~~use~~ ^{eating} of raw oysters.

The general use of raw oysters with the idea that they aid digestion is entirely ~~erroneous~~ ^{erroneous}. This has been shown by actual experiment ~~by a physician who crushed~~ ^{more once crushed} a quantity of oysters and kept them for several hours in a glass receptacle at a temperature of 100° ^{F.} ~~degrees,~~ the same as that of the stomach. A careful examine-

at the end of the time -122

tion showed that no digestion had taken place. If the oyster cannot aid in its own digestion, it is hardly reasonable to suppose that it could aid in the digestion of other substances.

EGGS.--The eggs of ^{the} a common fowl, ^{which are, as} ~~are very~~ extensively used as food, ~~and~~ have a nutritive value but little less than that of beefsteak. When perfectly fresh and properly prepared, eggs are easily digested; ^{but they remain fresh only three or four days in warm weather.} When fried or stale, however, they are extremely unwholesome. The white of a hard-boiled egg, if swallow-

ed without very thorough mastication, is digested very slowly. ^{are most easily digested} The most easily digestible form in which ~~eggs can be taken, is,~~

when beaten to a stiff froth and taken raw. ^{When stale, eggs}

^{are} ~~may not only be~~ unwholesome, but actually poisonous. ^{liable to be} Eggs are

affected by the character of the food eaten by the fowls which produce them. Eggs produced by fowls which feed upon the offal ~~and filth~~ and of barnyards cannot be considered wholesome food.

^{of} Eggs Used in excess, eggs produce injurious effects similar to those resulting from the use of meat, although ~~in the use of eggs~~

~~persons are not exposed to the same danger of contamination by~~ ^{there is not the} ~~disease~~ by parasites as in the use of flesh; ^{neither does} ~~and~~ the use of eggs ^{are} ~~does not~~ involve the horrors that connected with the taking of

animal life.. ^{heavy persons are made "bilious" by eggs} ^{because of their ready decomposition in} ^{the stomach}

MILK.--There is no single article of ^{food} ~~so~~ so universally used

by human beings as milk. Milk is the natural food of the young of all mammals. It is a matter of common observation, however, that cow's milk is not so well adapted to human sustenance as

the mother's milk which constitutes the food of the young infant.

It is often exceedingly difficult to make an infant thrive on a diet of cow's milk. ^{The author is} ~~Long observation has~~ ^{by long observation} convinced ~~us~~ that cow's milk is not the most wholesome food for adults. ~~It~~ ^{It} is a common ^{complaint} ~~observation~~ that milk produces biliousness. ~~Glenard~~, an eminent French physician, has called attention to the fact that milk

should never be used by persons suffering from dilatation of the stomach. ^{is the} ~~for~~ This class of cases in which milk produces biliousness, ^{most commonly} ~~the cause being decomposition of~~ the casein of the milk in the stomach, ^{Digestion so slow in these cases,} ~~whereby~~ ^{is decomposed} poisons are produced, which, being absorbed into the blood, produce general poisoning, with the symptom commonly termed "biliousness". ~~The reason for this is that~~ Cow's milk when taken into the stomach forms large, ^{in the stomach, which} ~~and hard curds instead~~ of the small soft curds formed by human milk. ~~These curds~~ are not easily broken up by the weakened walls of the dilated stomach, and, being long retained, undergo decay with the consequent ill results.

Germs in Milk.

Consumption and epidemics of typhoid fever and scarlet fever have been directly traced to the use of infectious milk. ~~Milk~~ ^{It} may be traced to various sources; it ~~may be infected in a great variety of ways.~~ Infection may come directly from the cow, from the milker, or from water used in ~~cleaning~~ cleansing the vessels, or in ^{usually} ~~fraudulently~~ diluting the milk. As received from the dairy-can, milk ^{usually} ~~always~~ contains ~~many~~ multitudes of germs. ^{of various kinds.} It is the presence of ~~these~~ germs which causes milk to sour.

~~120~~

and

Blue milk, red milk, yellow milk, bitter milk, thready or
viscid milk, owe their characteristic peculiarities to special
germs.

Milk from Stabled Cows. — Milk ~~is not the~~
~~best food~~, because it contains the impurities of
the blood of the animal from which it is taken.
If the animal's blood be pure, the milk is pro-
portionately good; if it is impure, the milk must
be likewise affected.
When cows are confined in a close stall, they
breathe, over and over, the same foul air, which is
always loaded with filthy vapors from their own

excreta. These vapors enter the blood, and poison every tissue and every secretion. The inhaled impurities make their appearance in the milk also, which thus becomes a means of excretion. If it is eaten, the filthy impurities of the stable are taken with it.

A writer of note truly says that "fully one-half of the deaths among the young are directly traceable to poisonous milk;" and yet thousands of people, especially in ~~the~~ large cities, are daily exposing themselves and their children to the possibility of fatal poisoning.



FIG. 1

FIG. 2

The taste is not always a reliable means for testing the quality of the milk; neither can the poisonous elements be detected by the closest scrutiny of the chemist. ~~but~~ The microscope reveals the presence of disease, although it may escape all other means of detection.

, however,

Fig. 1 is an accurate illustration of the appearance of pure milk when examined by means of a good microscope. It will be seen that it con-

tains nothing but rounded globules of various sizes, which are the so-called butter cells of milk.

Fig. 2 is an exact representation of the appearance of diseased milk under the microscope. This specimen was taken from a cow that was fed upon swill, and confined in a filthy stable. The difference between these two specimens will be readily observed. In Fig. 2, in addition to the rounded globules which are alone found in Fig. 1, ~~we have~~ ^{appear} great numbers of minute organisms which are indicative of disease. Milk of this kind cannot be habitually used without producing serious disturbances in the system.

Hygiene
Rules for the Care of Milk.

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✓ The following suggestions respecting the production and the care of ~~cow's~~ milk ^{are offered} may be considered of great practical importance.

1. Cows must be fed upon proper food. ~~Cows~~ st fed upon garbage, soon suffer from indigestion, and the milk is thereby deteriorated in quality, not only by the poisonous products of decomposition communicated by the garbage through the cow to the milk, but also by the products of indigestion in the cow, which are equally deleterious in character, and which find their way into the milk from absorption and secretion by way of the mammary gland. *they*

2. A cow must be supplied with an abundance of pure water. The same care should be taken to provide pure water for a milch cow as for a human being.

3. The milch cow should receive most scrupulous care as regards cleanliness. When a wet-nurse is to be selected for a young child, ~~the nurse~~ is usually required to bring a certificate from a physician that she is in sound health. A wet-nurse suffering from a skin disease, serious indigestion, decayed teeth, bad breath, or a constitutional taint of any sort, or who is of untidy habits, is at once rejected. *she*

she It is very remarkable indeed that we have been so slow in recognizing the fact that a cow is a wet-nurse for the entire family—the father, mother, older brothers and sisters, as well as the infant members of the family. The cow should be kept indoors only during the coldest weather, and should have daily exercise out of doors in all weathers. The stable should be airy and well ventilated, thoroughly clean and free from stable odors; the cow herself should be kept thoroughly clean, and unless allowed an opportunity to groom herself in a natural fashion, should be as regularly and thoroughly curried as a carriage horse. Before milking, all the parts liable to contribute anything to the milk-pail should be thoroughly cleaned. *and*

4. The dairyman himself should be neat and tidy in his work. The vessels which receive the milk should be protected, so far as possible, from stable dust. In the investigation conducted at the Connecticut Experiment Station, among the germs found in the milk, was one species which produced the familiar characteristic odor of the cow-pen; another gave that of a chicken-coop; another produced the odor of the pig-sty. The odors produced by other germs were equally characteristic of their origin. *(U. S. A.)*

To avoid the reception of germs and the absorption of poisonous volatile substances produced by the various germs which thrive in the vicinity of stables, the milk should not only be protected while in the vicinity of the milking stable, but should be removed as quickly as possible.

5. The milk should be quickly cooled after milking; not that there is anything injurious in the animal heat in the milk, but heat favors the development of the germs which, in spite of all ordinary precautions, are certain to be present in small numbers at least, while cold discourages the development of these organisms. A certain period of incubation takes place after the collection of the milk from the cow, varying in length from an hour or two to several hours, according to the temperature of the milk.

Experiments made in Germany have shown that milk which is cooled rapidly after milking, so that the period of incubation is sufficiently extended to allow of the consumption of the milk before the incubation is completed, is much less likely to produce disease than milk in which this precaution is not taken. The observations referred to were made upon a large number of children fed upon milk from various sources and treated in different ways. In all cases in which sickness could be traced to the milk, it was found that the precaution of cooling the milk had been

* Fig. — represents a sterilizer devised by
the author for home use; and ~~can~~ be
furnished by the Modern Medicine
Sanitary Supply Co. at Battle Creek,
Mich. (U. S. A.). Milk treated with
this sterilizer may be kept perfectly
sweet for an indefinite length of
time, the same as canned fruit.

omitted; while those infants who were fed with milk which was promptly cooled after milking and kept cool, were almost wholly free from disturbances from this cause.

Cases of tyrotoxon poisoning have been traced to the neglect of this precaution.

6. The ~~milk containing~~ vessels themselves ~~may~~ ^{containing the milk may} be a source of contamination of milk. This is a matter with which every housewife is acquainted.

Milk put into vessels which have not been properly scalded, promptly sours. Such milk, even though it is eaten before souring or other decomposition has occurred, is likely to produce disease in young children and ~~other~~ persons of feeble digestive powers, as the process begun in the pan is continued in the stomach. This is one of the reasons why milk fresh from the cow frequently agrees with invalids or with young infants when ~~milk~~ can be taken under no other conditions without injurious results.

adult

it

If the above mentioned precautions are adopted, and care is taken to ascertain that the animal from which the milk is taken is in a fairly healthy condition ~~and remains in a healthy state~~, no danger may be apprehended from the use of milk; but until the general public have become much more thoroughly educated upon this subject than is likely to be the case for some time to come, a wise precaution which may be safely adopted as a routine practice in the use of milk is sterilization, or Pasteurization.

remains

Sterilization consists in raising the temperature of the milk for a few minutes to the boiling point, or a few degrees higher. If the milk is heated to the boiling point, or a temperature of about 212 degrees, for a few minutes, all deadly germs and most other germs will be destroyed.

A few spores, however, are almost certain to escape, so that milk which has been merely boiled will not keep indefinitely.

For this, it is necessary that the temperature should be raised several degrees above the boiling point, or to about 220 degrees, and held at this point for ten to twenty minutes. The higher temperature named may be obtained by placing the milk in bottles, tightly corking, and boiling while immersed in a saturated solution of common salt. It is necessary to leave the bottles in the solution until it is cool, as they will break if suddenly removed from the hot solution.

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* 7/1/20

Objections have been raised to sterilization on the ground that it changes both the flavor and to some degree the composition of the milk at the same time that it destroys the microbes which it contains. To meet these objections the method known as Pasteurization has been proposed. After using this method on a large scale for several years, I can heartily commend it. It consists in heating the milk to a temperature of 158 degrees and keeping it at that point for fifteen minutes. Exposure for this length of time to the temperature named will destroy typhoid fever germs, and all other disease producing microbes which are at all likely to be found in milk, although it will not destroy all germs capable of souring milk or producing other forms of decomposition. The germs which produce decomposition of casein, such as takes place in the formation of cheese, require a temperature above that of boiling water. Pasteurization consequently cannot be depended upon for the long preservation of milk, but when carefully done, it is found that milk thus treated will keep from one to two days longer than raw milk. By the daily repetition of the process it is, of course, possible to preserve the milk practically unchanged for almost an indefinite length of time.

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It should be mentioned that it is important to cool the milk rapidly after heating, as Pasteurization merely prolongs the period of incubation or development of many of the germs which it contains, and it is important to maintain as low a temperature as possible after the heating, as heat greatly favors the process of incubation, or development.

This method of treating milk preparatory to using it is by no means as troublesome as it may appear. There are no obstacles whatever to its practical adoption on a small scale in private families, and its use on a large scale is not a matter which offers any considerable difficulties. For the last five years I have had Pasteurized or sterilized all the milk consumed in the institution of which I have charge, amounting to 1,200 to 1,500 quarts daily, and the work has been accomplished by very simple arrangements. After the removal of the cream with a centrifugal separator, the milk is heated in large double boilers and afterwards placed to cool in ordinary creamery tanks furnished with long, narrow receptacles.

So far as I can learn from inquiry, the milk supply of Union City is essentially that of most interior towns, neither better nor worse. It is certainly much superior to that of our large cities, but it is exposed to all or at least most of the dangers which have been pointed out in this paper, and doubtless is responsible for a certain proportion of the deaths which annually occur in the community.

The most serious dangers to which attention has been called are not those of an extraordinary character, such as cholera, typhoid, and other epidemic infections, but the ever present danger of infection from tuberculosis and to injury from the deleterious effects of the germs constantly present in milk collected and used under ordinary conditions.

If some of the conclusions of this paper seem to be overdrawn and the recommendations impracticable and fastidious, I shall neither be surprised nor offended, for the history of sanitary progress shows that at every advance step in the direction of improved hygiene this same obstacle has been met and surmounted.

We quote the following paragraphs from a paper read be-

~~xxx~~ ~~xxx~~ by the author, by request, before a Sanitary Convention

(U.S.A.)

held under the auspices of the Michigan State Board of Health at

~~Union City~~, October 1894!

Certain forms of influenza have been proven by Freudenreich, the director of the Bacteriological Laboratory of Berne, Switzerland, to be transmitted by means of milk. This was found to be especially true of the peripneumonia of hogs.

Dr. Hart, an eminent English sanitarian, records fourteen epidemics of scarlet fever and seven of diphtheria, originating in England, in which the contagion was disseminated through the medium of milk.

Typhoid fever has been found to originate in the use of infected milk in a great number of cases, as has already been shown. The typhoid fever germs grow with great facility in milk.

One of the greatest of all the dangers connected with the transmission of germs by means of milk, is encountered in the fact that the germs of tuberculosis thrive in milk, and retain their vitality for many weeks even, in butter and cheese. The bacillus tuberculosis, the contagious element of the disease commonly known as consumption, is probably more frequently to be found in milk than any other dangerous germ.

Hirschberger, an eminent German authority, found ten per cent of the cows in the vicinity of large cities affected by tuberculosis. Cows kept for dairy purposes in the immediate vicinity of cities are generally subjected to much more unhealthful conditions than those in the country. The milk of half the cows examined, or five per cent of the entire number, was found to contain the tubercle bacillus. As the milk from the different cows was mixed together, it is probable that nearly the entire milk supply of the cities supplied by the cows examined, was infected with consumption germs.

An investigation of this subject made in Copenhagen a few years ago, showed tubercle bacilli in one-seventh of all the specimens of milk examined.

Brouardel, an eminent French authority, found five cases of tuberculosis in a small boarding school of fourteen girls. The disease was traced to the use of the milk of a tuberculous cow.

Gasperini found tubercular germs alive in butter at the end of 120 days. Gautier found them alive in cheese at the end of thirty-five days.

The importance of this subject can only be appreciated when bearing in mind the extent and increasing prevalence of tuberculosis in human beings.

The revelations of the postmortem rooms connected with the metropolitan hospitals of this and other countries, have shown that sixty per cent of hospital patients who die have suffered at some time in their lives from infection by the bacillus tuberculosis, as evidenced by the characteristic lesions which have been left behind. The great majority have, of course, recovered from the disease—thanks to favorable conditions and the natural recuperative powers of the body—but this fact is, nevertheless, evidence that infection of the human race in civilized communities with the bacillus tuberculosis, has come to be, at the present time, exceedingly common. Indeed, it may be said that such infection threatens to become universal.

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A microscopic examination of the milk obtained from a cow in the ordinary manner shows that after the most careful straining it still contains a large number of germs and germ spores, which at the end of a few hours are found to have increased with such rapidity that thousands are to be found in every drop of milk, and at the end of twelve hours the number is often increased to millions.

~~In a special bacteriological examination made ~~the~~ in the Laboratory of Hygiene under the writer's direction for the purpose of determining the ~~character~~ of various number of germs ordinarily present in milk, the following results were obtained: -~~

~~(see report in G. H. & mod med)~~

Milk sterilized at the ordinary boiling temperature, ~~that is,~~
212^o ~~degrees~~ ^{F.} will keep, two or three days longer than ordinary milk; *but*
~~and will keep for two or three days (in an ordinary refrigerator)~~

It will soon spoil, however, for the reason that a ~~much higher~~
^{higher than boiling} temperature is required to destroy many of the germs found in
milk. ^{The required} ~~A higher than boiling~~ temperature may be obtained by

placing the bottles containing the milk in a saturated solution of
common salt. ~~Fig. ... represents a sterilizer devised by the au-~~

to
the

~~thor for home use, and is furnished by the Modern Medicine Sani-
tary Supply Co. at Battle Creek, Mich, U.S.A. Milk treated with
this instrument may be kept perfectly sweet for an indefinite
length of time the same as canned fruit of any sort.~~

CONDENSED MILK.--The public have, for many years, been sup-
plied with various brands ^{preserved} of milk, condensed by evaporation at a
temperature below the boiling point, and preserved by admixture
of a considerable quantity of cane-sugar. Milk prepared in this
way is not sterilized, and contains the same quantity of germs as
does ordinary milk. The use of ~~milk~~ sweet and condensed milk is
also open to the additional disadvantage that it contains cane-
sugar, which is likely to interfere to some extent, with stomach
digestion, *especially in infants.*

EVAPORATED MILK.--More recently a form of preserved milk, known
as evaporated milk or evaporated cream, has been placed upon the
market, which, being prepared without sugar, and thoroughly steri-

*

Malted milk may be prepared as follows:

Take of two ounces of fine wheat flour a moderately thick paste.

Cook thoroughly. Set into a vessel containing cold water until sufficiently cool, that the finger may be held in the paste while counting ten. Now stir into the paste one ounce of finely ground malt from which the bran has been separated. Stir together and place the vessel containing the mixture in a vessel containing water at a temperature of about 140° F. (60° C.) If a thermometer is not at hand, the desired temperature may be approximately obtained by mixing together equal parts of boiling water and water of ordinary temperature.

Let the paste mixture stand for two hours or until it has become quite thin, then add ^{double the} ~~an equal~~ quantity of milk and boil for fifteen minutes. If desired, the preparation may be thinned by the addition of milk or water.

lized in the preparation, is ~~entirely~~ free from the objections which have been mentioned .

MALTED MILK.--This is a preparation of milk which is made as follows: To a thin gruel of wheat flour is added a portion of malted barley meal. By the action of the diastase of the malt, upon the starch ~~it~~ is converted into sugar. A portion of ~~the~~ milk is then added, and the whole evaporated to dryness. This form of milk can be used by many persons who cannot take ordinary milk, as it does not form large curds in the stomach. *

SOUP MILK.--Sour milk is probably more extensively used than milk in any other form. Among the natives of Africa, Greece, Turkey, and many other parts of Europe, ~~sour~~ milk is seldom used until ~~after having~~ ^{it has} been subjected to a souring process. In some parts of Africa, the milk is soured by being kept ^{over night} in a gourd which is kept for the purpose. As the gourd is never washed, the germs which produce the souring of the milk are always present in ^{such} ~~great~~ quantities ~~so~~ that the milk is readily rendered acid, and is curdled in a few hours. ~~It~~ Although sour milk contains microbes, it has the advantage over ordinary raw milk that many of these germs are killed by the lactic acid produced in the souring process.

Another advantage must be recognized in the fact that milk, ^{which has} ~~having~~ once been curdled cannot again form curds ^{in the stomach.} ~~so that when taken into~~ ~~the stomach,~~ ^{of some milks are} the curds ~~being~~ broken up in the process of mastication ^{and} are more readily digested than the large hard curds which ^{when the milk is taken sweet} are often formed by the rennet ferment in the stomach. The lactic

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dyspepsia

acid present is also an aid to digestion in certain forms of ~~it~~
~~digestion.~~

Many persons who cannot take either raw or sterilized milk without being made "bilious" ~~xxx~~ are able to use sour milk either in its ordinary form or in the form of cottage cheese with no inconvenience.

BUTTERMILK.--This form of milk possesses the same advantages as have been mentioned in relation to sour milk. ^{Good fresh} Buttermilk is nourishing, and is sometimes an aid to digestion.

KUMYZOON.--This term is derived from two words, "kumyss", a name applied to fermented milk used by the Tartars as a ~~fermented~~ drink, which they prepare by the addition of yeast and sugar to ^{Waxes} ~~the~~ milk, and "matzoon", the Turkish word for sour milk. Kumyzoon differs from both matzoon and kumyss in the fact that it is prepared from thoroughly sterilized milk by means of a lactic acid ferment, which gives to it the advantage of both sterilized milk and sour milk without the inconveniences of either; since raw milk produces biliousness through the formation of curds, while sour milk constantly varies in flavor and characteristics, in consequence of the great variety of germs which it contains.

CREAM.--Cream is similar to milk in its dietetic properties, except that it is more easily digestible ^{ed} by some persons in consequence of the presence of a smaller portion of casein, ^{and} hence ~~being~~ ^{it} less likely to form large curds ~~to decompose~~ in the stomach.

Cream diluted in water is often more digestible on this account than ordinary milk. Cream, however, contains a larger proportion of germs than does skim milk, for the reason that it is longer exposed to the air, whereby the development of germs is encouraged, and other germs are ^{also} received in the form of dust. Cream, like milk, produces the condition called biliousness in many persons, and hence must be avoided *by them.*

BUTTER.--Ordinary butter, like cream and milk, contains multitudes of microbes. It is for this reason that butter quickly becomes rancid when exposed to the ordinary temperature.

~~Ordinary~~ Butter made from cream which has undergone decomposition to a ^{greater} ~~more~~ or less extent before churning can scarcely be considered a wholesome food. Persons with weak digestion are often unable to make use of butter in consequence of the ~~great~~ ~~number of microbes which it contains and which set up~~ fermentation and decomposition in other food substances taken with it. *which it induces*

The author has for a long time advocated either the disuse of butter altogether or the ^{substitution} ~~exclusive use~~ of sterilized ~~xxx~~ butter, which ~~consists of butter~~ made from sterilized milk or cream, and kept sterile by being kept at a low temperature and ~~with the exclusion~~ ^{ded from the} of air.

Butter eaten upon hot bread renders ^{the bread} ~~it~~ almost indigestible by surrounding the particles of starch with fat, so that the saliva cannot come in contact with them; it also excludes the gas-

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tric juice, in the same way, from ^{the} digestion of albumin, thus interfering seriously with the digestion of food in the stomach. The same is true of lard, suet, ^{oils,} and all other free fats. The greatest objection to butter, however, is doubtless to be found in the germs which it contains.

Sterilized butter may be eaten cold upon stale bread without inconvenience by persons who cannot take butter in any other form. ~~and when taken in this way may be considered wholesome.~~

CHEESE.--Milk in the form of cheese is an article absolutely unfit to enter the human stomach. Cheese is simply milk in a state of more or less advanced decomposition. The flavors of cheese are wholly due to the action of microbes, or germs, of various sorts in decomposing the constituents of milk, giving rise thereby to various substances, ^{of which are} some possessed of highly poisonous properties, ^{while} others produce substances with more or less pronounced and characteristic flavors.

In the manufacture of certain kinds of cheese certain forms of mold are utilized. The modern cheesemaker as well as the ~~modern~~ butter maker gives to his product any flavor which he desires by the addition of special germs obtained from a bacteriologist, which he knows to be capable of producing the desired flavor.

The fact that cheese is unfit for food may be readily inferred from the frequent presence of minute creatures known as mites, or "skippers". Skippers are simply the maggots, or young, of a certain species of flies which deposit their eggs in the cheese just as other flies deposit eggs in decomposing meat, being led ~~thus~~ to do ^{so} by the scavenger instinct given ~~to~~ them by Nature. In the case of maggoty meat, civilized human beings are ready to leave the scavenging to the legitimate agents which Nature appoints for this purpose; but, in ^{the} case of cheese, ~~we (that is, those~~ ~~of us who eat cheese, the author does not)~~ ^{they} devour the decomposing mass, scavengers and all, just as the degraded natives of some countries devour maggoty meat. Man is truly the great scavenger of scavengers.

~~But~~ ^{are not found in all cheese,} ~~All cheese does not contain~~ skippers ~~or mites,~~ but all cheese contains bacteria, or germs, in great numbers. ~~A Frenchman who has taken the trouble to estimate the number of germs found in cheese, reports as follows:~~

~~(Look this up in Good Health and quote.)~~

~~germs in cheese~~ ~~1944~~

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The Inhabitants of Cheese. According to the observations recently published by Prof. Adametz, who has been making a careful study of the microscopic organ-

isms which inhabit cheese, this common food substance contains, in addition to the skippers, mites, and other visible maggots and larvæ with which all are familiar, prodigious numbers of microbes of various sorts.

According to Prof. Adametz, perfectly fresh cheese contains to every gram (fifteen grains) from 90,000 to 140,000 microbes. The population of a soft cheese twenty-five days old was found to number 1,200,000 for every gram, while the same quantity of a cheese forty-five days old, was found to contain 2,000,000 microbes. It was observed that the microbes were much more numerous near the outer portion of the cheese than in the center, probably due to the fact that proximity to the air favors their growth. One soft cheese examined was found to contain, near its outer surface, from 3,600,000 to 5,600,000 germs, in a quantity of cheese barely equaling in size a small marble. Combining many observations, it was found that ~~cheese~~ on an average, ~~contains in~~ every pound nearly twice as many germs as there are people upon the face of the earth.

of cheese contains

Poisonous Oysters.—A French scientist has recently been investigating the cause of the frequent occurrence of poisoning from the use of

oysters and other mussels. As the result of the investigation, he came to the conclusion that the poisonous action of mussels is due to the presence, especially in the liver of the fish, of an organic base, the mytilotoxine of Brieger, and that this is developed under the influence of a particular ~~microbe~~ ^{germ} occurring only in mussels that have lived in stagnant or polluted water. It should be added that it has been observed that oysters reared near the outlet of city sewers are frequently found to produce poisonous symptoms when eaten, especially at certain seasons of the year.

a deadly poison

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The reader may be interested in the results recently obtained in some special investigations conducted at the writer's suggestion, in the Bacteriological Laboratory of the Sanitarium, Battle Creek, Mich., U.S.A. ~~by his colleague, Dr. G.W. Burleigh.~~ The purpose of the research was to determine the influence of various articles of food upon the number of germs to be found in the fluid contained in the stomach one hour after the food had been taken.

In the case of granose, zwieback, and other thoroughly sterilized ^{farinaceous} foods, it was found that no germs at all were present, the gastric juice being able to destroy all the germs carried into the stomach from the mouth and the air along with the food. But when a cubic inch of cheese was eaten along with eight ounces of water, countless numbers of germs were found, the gastric juice being unable to destroy them.

In one experiment the number of these germs found in a dozen drops of the fluid obtained from the stomach an hour after the cheese was eaten was more than 100,000. These germs varied in character, including ~~among the rest~~ a large number of molds. The writer has met a number of cases in which fatal inflammation of ~~the~~

the bowels could be directly traced to the use of cheese ~~in cases~~ of so-called cheese-poisoning, which ^{of the University of Michigan,} Prof. Vaughan has shown ^{forward that} ~~to be~~ due to the presence in cheese of an unusual quantity of a special poison to which he ^{has} given the name of tyrotoxicon, ~~or cheese-poison.~~ This poison has been shown to be always present in cheese,

called cheese poisoning

to be due to the presence in cheese of an unusual quantity of a

special poison to which he ^{has} given the name of tyrotoxicon, ~~or cheese-~~

~~poison.~~ This poison has been shown to be always present in cheese,

in a greater or less amount. Under certain conditions, the germs continue to which produce this poison ~~cannot~~ grow and develop in the stomach, giving rise to the symptoms of cholera ~~morbus or cholera infantum.~~

~~It is the firm conviction of the writer that cheese is an article wholly unfit to enter the human stomach.~~

Certain varieties of cheese, such as Roquefort cheese and Brie Cheese, owe their characteristic qualities to the presence of an extensive growth of mold. Edam cheese owes its ~~qualities~~ ^{peculiarities} to ~~peculiar~~ ^{certain} germs which give rise to a stringy or viscid condition, when present in the milk .

DECOMPOSING FOODS.--All processes of fermentation and decay are the result of the action of germs upon organic, that is, animal or vegetable substances. These changes occur at ordinary temperatures, but are more rapid at temperatures somewhat above the ordinary ~~temperature~~, ^{and} ~~but~~ are much less active at temperatures near the freezing point.

Experiments which have recently been made show that decomposition begins in meat within twenty-four hours after the death of an animal, even when kept in a refrigerator. Decay of organic matter is always accompanied by the production of poisons. For this reason, meat, cheese, ^{or} game which has acquired a high flavor, is extremely unwholesome. ["] Sauer kraut, ["] finnan haddie, ["] and similar articles, which are much ~~liked~~ ^{relished} by many persons, are wholly unfit for food.

The disgusting habit of eating decomposing flesh which prevails in Burmah, is quite matched in ^{many countries} ~~this country~~ in the eating of the flesh of animals which have been so long dead that decomposition has begun, and in the use of the Limberger and similar varieties of cheese, ~~in Germany.~~

FERMENTED FOODS, ~~BEER~~.-- Under this head may be properly included that very common article of food, leavened, fermented, or raised bread.

There are two kinds of raised bread,-- that made by the addition of yeast to the dough, and that which is allowed to rise spontaneously by the action of the spores, or germs, of yeast which are always present in the flour.

Persons of sound digestion are able to eat fermented bread, and even meat and other articles which are undergoing decomposition, with apparent impunity, thanks to the antiseptic ^{and} disinfectant properties of the gastric juice. But ^a ~~the~~ person whose digestive powers ^{are} ~~is~~ feeble, or who, in other words, ^{is} suffering from hyperpepsia or apepsia, and persons who have dilated stomachs, often suffer serious consequences from the use of such food.

In ^{the} case of fermented bread, the spores ~~or germs~~ of the yeast, together with molds and germs of various sorts, are ready to begin growth and development in the stomach ^{as soon as the} ~~when~~ bread is eaten, since ^{has been} the heat to which the bread ~~is~~ exposed in baking is not sufficiently ~~great~~ to destroy them.

The housewife not infrequently finds herself baffled in her attempts to make good bread in consequence of the presence ⁱⁿ of ~~a~~ particular flour used, of germs, which, while the bread is rising, set up unusual and undesirable changes.

Leavened bread may be rendered wholesome by baking a second time, ^{by} or converting it into zwieback. This is done by cutting the loaf into thin slices, and exposing them to heat until browned throughout.

INDIGESTIBLE FOODS.-- The digestive organs of man require a certain amount of residual or nitrogenous material ~~to stimulate proper intestinal activity, and~~ to give to the food the necessary bulk, and thus secure the proper degree of intestinal activity. The same is true of all herbivorous and frugivorous animals. ^{Too} ~~A~~ ^{con-}centrated diet results in inactivity of the bowels and other most serious consequences. This is one of the important reasons why ~~fl~~ flour or meal prepared from whole grain should be used in preference to superfine flour.

Such ~~indigestible~~ foods as pickled cucumbers, pickled tomatoes, pickled olives, pickled green walnuts, etc., cannot be recommended as wholesome, on this account, for the reason that the chemical processes to which they are subjected in ^{preparation} ~~baking~~ is such as to render them practically devoid of nutritive qualities, ^{as well as indigestible.}

BAD COOKERY.-- ^{One of the most harmful} ~~Among the most atrocious practices to be charged against~~ ⁱⁿ our modern modes of cookery ^{that} ~~is the practice~~ of frying foods of various sorts. By the process of frying, the food, wheth-

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er starchy or albuminous, is rendered practically indigestible in the stomach, for the reason that the food elements are encased in fat, and hence the ^{neither} saliva ^{nor} and the gastric juice have ^{any} ~~no~~ effect upon them whatever. In addition to this, the fat is ^{usually} burned, where- by it is rendered not only indigestible, but ~~is rendered~~ acrid and irritating to the gastric mucous membrane.

Highly seasoned cakes, pies, rich pie-crust, and other forms of rich pastry, ^{also} are exceedingly objectionable as articles of food. They are highly indigestible, and must be excluded from a rational bill of fare.

Rich sauces, highly seasoned gravies, griddle-cakes, soda biscuit, and the use of saleratus or baking-powder, are other evils in our modern cookery to which public attention ought to be called. Any form of farinaceous food, such as pie-crust or rich cake saturated with fat is ^{practically} ~~scarcely more~~ digestible ~~than bullets~~. Soda and saleratus destroy digestion by neutralizing the gastric juice and irritating the solar plexus. Baking-powders, while in some respects a slight improvement over the old-fashioned method of using soda or saleratus with sour milk or some other acid, are, nevertheless, so highly objectionable that their use should not be tolerated.

The constituents of the best baking-powders, when mixed, form a ~~paste, when mixed, form~~ ^{chemical} compound, ^{resulting in} ~~practically,~~ of what is commonly known as Rochelle salts. A dose of Rochelle salts taken at every meal cannot be considered as conducive to good digestion.

from which a few recipes are ~~selected and~~
given ~~printed~~ elsewhere in this work 241

9/ A skilled cook can make a light and most palatable bread without
the use of ~~either salt~~ ^{soda, saleratus,} or baking-powder. Many methods of making
light and palatable water-breads are described ⁱⁿ by Mrs. Kellogg ⁱⁿ
~~her~~ work on scientific cookery, entitled, "Science in the Kitchen." *

* Add a
few to
this book

An excellent whole-wheat meal bread is made in Sweden, baked
in large thin cakes, with a hole near to one side by means of which
~~the~~ ^{they} ~~fish-shaped loaves~~ are hung up upon strings, and ^{allowed to} become very
hard and dry, and ^{this bread is} ~~are~~ very wholesome and nourishing. The black
bread of Germany and Russia is ^{which so} much liked by the peasantry of these
countries, ~~and~~ is certainly conducive to intestinal activity, and
^{perhaps superior from a health standpoint,}
is ~~certainly equal, in nourishing qualities,~~ to the finer quali-
ties of wheat bread.

There are many forms of ^{un} fermented bread ^{which are} exceedingly palatable
and wholesome. ^{them} Among which may be mentioned gans, rolls, beaten bis-
cuit, crisps, crackers, etc. In the southern parts of the United
States, an unleavened bread made of corn-meal, known as "hoe-
cake" is much used. The ground corn is mixed up with water and a

little salt, and is then spread out on a board and baked before a
^{the writer has often seen the native women of Mexico preparing}
fire. ~~In Mexico and the states bordering upon Mexico,~~ an excellent
water-bread known as "tortillas" ^{they first} ~~is made from corn,~~ grinding the
corn upon a stone, ^{and} then baking ^{it} in a thin cake upon a hot iron. A similar
bread is made ^{by} the housewives of Arabia and the
Soudan.

The negro^s of the South bake their hoe-cake on ~~the~~ a board before the open fire. The natives of some portion^s of India cook rice in a bamboo stem which is placed in the fire. The natives of New Zealand cook and bake their food by means of hot stones, which ~~is~~^{are} placed about the food after it has been protected by a covering of banana leaves.

It may be constructed thus: Make a table about two feet square, with legs one and one half feet in length. Make a hole in the table-top at least six inches in diameter. Arrange a few pebbles around the hole, laying over it a piece of tin, or a thin slab of stone of sufficient size to extend beyond the margin of the opening an inch or two all around. Place the jar or other vessel containing the food upon the tin or stone slab; then cover with a large pail or a tight keg, turning the mouth downward. Light a large kerosene lamp, place it under the table and ^{as} close to the under side of the stone slab or tin plate as possible without causing it to smoke. In four or five hours the food will be perfectly cooked.

An Emergency Oven

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Hard vs Soft breads

Unleavened bread may be baked in a very simple oven. The Mexican housewife bakes her "tortillas" upon a ~~hot~~, thin, flat, heated stone, or a piece of sheet-iron placed ^{over} upon the glowing coals. In an emergency, a very satisfactory oven ^{may} ~~can~~ be constructed from an ordinary water-tight ^{keg, or box,} barrel, and a ~~large-sized~~ kerosene lamp. As good bread as the writer has ever tasted was baked in such an oven.

Hard bread ^{is much to be preferred} ~~must be preferred~~ to soft bread. Bread is a grain preparation. Grains are farinaceous, that is, they consist largely of starch, and hence, for gastric digestion, require thorough mastication. Stale bread is, on this account, much to be preferred to new bread. ~~Another reason for preference to stale bread~~ ^{Another reason against the use of new bread} is the fact ^{when} ~~that in~~ chewing, it ~~does not~~ form into doughy masses which are digested in the stomach only with very great difficulty.

SUGAR.--Sugar, as most commonly employed as food, is not altogether a natural product, ^{as it} requiring the intervention of chemical processes in its production. It is probably ~~that~~ for this reason that cane-sugar is ^{more} ~~most~~ likely to disagree with the stomach than sugar found in its natural state. Cane-sugar is not, like starch, digested in the stomach, being acted upon only by the intestinal juice. When taken in considerable quantity, it gives rise to catarrh of the stomach, interferes with the digestion of starch, and encourages indigestion.

The most common ^{sources of} ~~forms of~~ cane-sugar, are, cane, sorghum, and the maple-tree. It is also found in watermelons and the sugar beet.

In the form of crystallized sugar, syrup, or molasses, ^{cane} sugar finds its way upon nearly every table in civilized countries. To its extensive use may, in part, be attributed the general prevalence of digestive disorders in this country.

For many years, Sugar has been subject to very extensive adulteration by ^{the} admixture of glucose, a sweet substance produced by the action of sulphuric acid upon starch. ~~A few years ago, it was next to impossible to find in the market a specimen of sugar or syrup which was not thus adulterated.~~

HONEY.--Honey is chiefly composed of fruit sugar, and consists of an admixture of about equal parts of glucose and levulose. Glucose is less sweet than cane-sugar, ^{while} levulose is much sweeter, ^{and in fact,} is the sweetest of all the sugars. Honey may, on this account, be considered a more natural form of sugar than cane-sugar, and is perhaps more readily digested and absorbed.

The chief objections to the use of honey are the fact that it ^{always} frequently contains ~~disseminated~~ germs, and sometimes ~~contains~~ so large an amount of poisonous matters derived from the poison-bag of the bee, as to produce unpleasant effects upon very susceptible persons. The ^{first} principal objection to the use of honey may be overcome by exposing it for half an hour to boiling temperature in a ^a double boiler. ^{Honey as well as all other sweets must be used in great moderation by all, and should be avoided by persons with weak digestion.} MALTOSE, or MALT SUGAR.--When starch is acted upon by the saliva ^a or by the diastase of malt, it is converted into the form of sugar known as maltose, or malt sugar. A Person who cannot eat

starch because of inability to digest it, ^{is} are often able to take ~~pre~~digested starch in the form of maltose with out injury. Glucose, which has sometimes been recommended for such cases, is not a proper substitute for starch or ~~for~~ maltose.

Sweet element in malted milk and in liquid malt.
 LACTOSE, or MILK-SUGAR.--This is a ~~saccharine~~ ^{sweetish} substance found

in milk. It somewhat resembles maltose, but is much less sweet. In ^{the} souring ~~the~~ milk, it is converted into lactic acid.

FAT,--The fatty elements of food may be derived from either the animal or the vegetable kingdom. The purest source of fats is to be found in fresh nuts, all of which contain a large proportion of fats. ~~In some instances~~ ^{Some varieties of} nuts contain one-half their weight ~~in~~ oil.

Animal fats are in no way preferable to vegetable fats. They are much more likely to become rancid, frequently disagree with the stomach, ^{besides being} ~~and are~~ more difficult to digest. ^{and} In the form of lard and suet, ~~they are~~ ^{is} not infrequently derived from diseased animals. Butter is the best of all the animal fats, but ^{even that} always contains germs, as has been already pointed out, ^{and} Unless sterilized, ~~it~~ is quite unfit to eat. Cod-liver oil, which for many years ~~has~~ been largely ^{prescribed} ~~used~~ in cases of ~~mal-nutrition~~, ^{inacaciation and wasting disease,} is ~~used, if at all,~~ simply ~~as~~ an oleaginous food, ^{and is in no way preferable to good vegetable fats or cream, and is} ~~and is in no way preferable to good vegetable fats or cream, and is~~ ^{certainly} ~~far less~~ agreeable.

^{more or less} The use of free fats of any sort, ~~is, to a considerable degree,~~ objectionable, for the reason that, in this state, ^{they} ~~fats~~ do not readily mingle with the contents of the stomach, but smear ~~it~~ ^{the food particles} over with ^{a coating} masses of fat, ~~and~~ thus interfere ^{ing} with the action of the digestive

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fluids. ^{however,} Emulsified fat mingles readily with water and with the ^{other} contents of the stomach, ~~whatever they may be,~~ as does also cream.

Excess of fat gives rise to biliousness, ^{distributing digestion, and} ~~by~~ clogging ^{of} the liver.

Lehmann, an eminent French physiologist, determined this fact by an ^{an} actual experiment, ^{which showed that fats accumulate in the}

^{liver when taken in excess.} ~~Fats should be sparingly used, especially in summer time. The~~

~~the use of fats in the summer time.~~ ^{Particular abstemiousness should be exercised in regard} ^{especially} ~~use of~~ ^{are} foods containing a proper amount of fat, as do nuts and such grain preparations as corn-meal and oatmeal, ~~to especially to be~~

recommended to those who desire to make a rapid gain in flesh.

CONDIMENTS.-- A little boy upon eating horseradish for the

first time, spat it out upon his plate. When asked by his mother why he behaved so impolitely at the table, he replied, "I think I ^{will} wait until it gets cold before I eat any more." Substances

which are hot when they are cold, should never enter the human stomach. Mustard, cayenne, capsicum, Worcestershire sauce, ^{Vinegar,} ~~ginger,~~

and the whole list of spices and condiments, are not only innutritious and indigestible, but are also highly productive of dyspepsia.

^{It has been proven by experiment that} They do not stimulate the flow of natural digestive fluids,

~~as we have proven by actual experiment,~~ but simply cause the digestive organs to pour out an abundance ^{of mucus} to protect the sensitive

membrane from the irritating effects of these substances which were never intended by Nature to be taken either as food or with food.

Condiments are, without exception, irritating substances which are by Nature placed upon certain vegetable products as sign-boards that they are ~~never~~^{not} to be eaten. It is only a depraved appetite that craves them, ^{which is proved by the fact that} No child likes condiments; the taste for them must be acquired. The use of condiments is unquestionably a cause of appendicitis, a disease which, although not recognized until recent times, has doubtless been responsible for a great number of deaths. ^{It arises from an} ~~In this disease, an~~ inflammation of the appendix vermiformis, a small, pouched appendage, ^{at} ~~occurs, and~~ the lower end of the ascending colon ^{which} ~~becomes inflamed, and~~ not infrequently suppurates, giving rise to general inflammation, or peritonitis.

Condiments ^{in the opinion of the author,} are particularly productive of this sort of inflammation, for the reason that they are indigestible, and when discharged from the small intestine into the large intestine, the ^{di} ~~ingestible~~ particles are naturally deposited ^{at} into the lower end of the large intestine ^{or ascending colon,} about the mouth of the appendix, which thus becomes irritated and inflamed.

Spices. - The almost universal fondness for spices is a curious illustration of the readiness with which the simplicity of the natural taste may become depraved. Pepper was used before 400 B. C. Pliny speaks of its use in his day, and expresses his astonishment that men should esteem it so highly when it has ^{neither} ~~not~~ a sweet taste ~~nor attractive appearance~~, nor any other desirable quality. ~~We can heartily sympathize with Pliny in his astonishment.~~

Nutmegs and mace are quite extensively used as spices in this country and in Europe; but neither one is ever used as a condiment in the country from which they were first brought, the Isles of Banda.

and

Facts about Salt.— It is a general supposition that salt is indispensable as an article of diet. Many people suppose that life cannot be sustained without it. Nevertheless, there are numerous facts which indicate that this popular supposition is erroneous.

~~It is not necessary to support animal life,~~

Rom

as shown by the fact that its use is confined to a very small minority of the animal kingdom.

~~It is not necessary to sustain human life,~~ as is conclusively shown by several facts: (1.) Scores of persons who have been accustomed to its use have wholly discarded it, not only without detriment to their health, but with positive improvement. (2.) Millions of human beings in Central and Southern Africa, in South America, in some portions of North America, in Siberia, and in other parts of the world, subsist entirely without salt. (3.) This is not altogether because salt cannot be obtained; for in Southern Africa, where salt abounds, neither human beings nor lower animals make any use of it whatever.

Rom

We would not recommend that salt should be wholly discarded in all cases; but there can be no doubt that many cases of disease of the stomach and liver originate in the excessive use of salt. Persons suffering with torpid livers will find great benefit by abstaining almost wholly from its use, together with that of other condiments.

It is stated on good authority

~~A gentleman who has just returned from a visit to England states~~ that many of the English stock-raisers who are noted for producing the finest cattle in the world, never think of feeding their cattle salt, as is so commonly practiced in this country.

in the form of calomel, and blue mass, etc.

The free use of mercury, ~~most probably~~ ^{may} gives rise to appendicitis, ~~in the same way,~~ as it has been shown that this drug, when thus used, sometimes accumulates in the ~~small~~ ^{large intestine,} where it produces ulceration by the gradual conversion of the calomel into corrosive sublimate by combination with ~~the~~ ^{latter} common salt ~~contained~~ ^{latter} in the food.

By the extension of the disease to the appendix the disease known as appendicitis is produced.

~~HN A~~

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(Add to "Condiments.")

(Quot 1

VINEGAR.--As the use of vinegar is continually increasing, attention should be called to the fact that it may be a cause of disease. Ordinary vinegar contains about five per cent. of acetic acid, ^{to which its acidity is due,} ~~its principal ingredient.~~ Like alcoholic liquors, vinegar is a product of fermentation, being the result of carrying a little farther the same process by which alcohol is produced. Vinegar is much more irritating to the digestive organs than an alcoholic liquor of the same strength. Its ^{irritating} ~~exciting~~ nature makes it extremely debilitating to the stomach. Dr. William Roberts, of England, has shown that so small a proportion of vinegar as one per cent. completely arrests the action of the saliva upon starch. The writer's own experiments have confirmed the observations of Dr. Roberts.

The moderate use of a light wine or of ale or beer is much less destructive to the digestive organs than a free use of vinegar. This remark is made, ^{however, with no intention} ~~not to~~ commend wine or beer, ~~however,~~ since these substances are possessed of no virtue, and are capable of doing a vast deal of harm. There is really no need of resorting to so inferior a source, ^{as vinegar} for a mild acid, as we have the want met most perfectly in lemons, limes, ~~citrons~~ and other acid fruits. As a dressing for ^{certain} ~~some~~ kinds of vegetable food, lemon juice is a perfect substitute for vinegar. Recent observations have shown that the vinegar cells which are ^{usually} ~~nearly always~~ to be found in "good cider vinegar" often take up their abode in the alimentary canal, becoming intestinal parasites, and producing much mischief, ^{which furnishes} ~~an~~ ^{an other} reason for discarding this objectionable article.

reason for discarding this objectionable article

~~THE~~

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~~Add to "Condiments".~~

Vinegar is ^{also} often adulterated, ^{to such an extent that it contains} ~~containing~~ a very small proportion, if any at all, of real apple juice, the acidity being due to hydrochloric or sulphuric acids, ~~therefore~~ such vinegar is even more destructive to the functions of the stomach ~~and~~ ^{as well as} ~~also~~ to the teeth than ordinary vinegar.

Causes of
Errors in diet

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Wrong habits in eating, aside from personal habits in relation to eating, have as important a relation to digestion as the character ^{or quantity} of the food eaten. Healthy digestion depends upon four conditions:—

1. The secretion of a sufficient amount of gastric juice of good quality.
2. The prompt absorption of the digested food substances.
3. Proper activity on the part of the muscular walls of the stomach, by which the organ is emptied of its contents at the end of two, or, at the most, three hours.
4. An aseptic condition of the stomach, that is, a state in which it is free from germs or microbes.

Various habits in relation to eating affect these several conditions of good digestion either favorably or unfavorably. Let us briefly consider how those habits which affect the stomach unfavorably in respect to the conditions named may interfere with digestion and produce indigestion or dyspepsia:—

1. If gastric juice is not secreted in proper quantity, the germs which are always introduced with the food ^{to some extent,} ~~in greater or smaller quantity,~~ some being derived from the mouth, even when the food is perfectly sterilized, undergo development, and set up fermentations and decompositions of food, causing ^{so-called} "heartburn", sour stomach, eructations of gas, biliousness, and other well-known symptoms of indigestion. Dilated stomachs are always weak stomachs, and, with rare exceptions, produce a very poor quality of gastric juice.

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It is for this reason that persons suffering ^{from} dilatation of the stomach are unable to eat, without injury, meat, milk, or other substances which readily undergo fermentation.

2. Anything that interferes with the prompt absorption of the digested food, or which causes its long retention in the stomach, also favors decomposition of food, for the reason that, as shown by Prof. Bouchard, decomposition always begins in the contents of the stomach when they are retained for five hours or more. The stomach ought to empty itself in from 3 to 4 hours after the food is eaten, according to the quality of the food. Insufficient mastication of the food, the use of raw food, and food impregnated with fats, pickles, and similar indigestible articles, ^{are} the most frequent cause of delayed absorption and delayed emptying of the stomach.

Although the stomach is naturally free from germs, ^{owing} ~~thanks~~ to the germ-destroying property of the gastric juice, it will readily be comprehended that a stomach which is compelled to receive such food as cheese, meat which is undergoing decomposition, sauer kraut, warm fermented bread, and other substances which are swarming with germs, will, after a time, lose its power to disinfect these substances, and ~~they~~ become the habitat of many ~~harmful~~ disease-producing germs. A coated tongue is an indication of an infected state of the stomach. The following are some of the most common errors in relation to habits of eating: —

1. Hasty Eating. — As the result of deficient mastication,

~~the food not being properly divided, the digestive juices cannot gain access to its several elements, an insufficient amount of saliva is mingled with it, so that the starch is imperfectly digested, and the food, on entering the stomach, acts as a mechanical irritant, giving rise to gastric catarrh, hyperpepsia or an excessive secretion of gastric juice, acidity, fermentations, catarrhal or infectious jaundice, and, in some instances, gallstones.~~

the food *salivary digestion* *performed*
without the proper digestion of its starch
also
with *These insufficient mastication leads to*
acidities *fermentations* *catarrhal* or *infectious* jaundice, and, in some instances, gallstones.

~~if the food is insufficiently masticated, salivary digestion fails, and, as the result, gastric digestion is imperfectly performed, for the reason that the formation of dextrine by the action of the saliva upon the starch is Nature's method of stimulating the stomach for the secretion of gastric juice, and the digestion of albumin.~~

salivary digestion
also
preparing the
food for the action
of gastric juice, and the digestion of albumin.

The best remedy for hasty eating is the use of dry food.

In experiments made by the author in the Physiological Laboratory, ^{of the} Battle Creek, Mich. (U.S.A.), Sanitarium, it was found that an ounce of dry food, chewed for five minutes, produced two ounces of saliva, ^{while} ~~and that~~ an ounce of soup chewed for the same time produced only one-tenth as much saliva as ^{did} dry bread or granose.

~~Thus~~ The extensive use of mushes, gruels, and other soft foods, and the habit of drinking at meals ~~and~~ ^{to} rinsing down the food instead of chewing it until masticated and softened by the saliva, is unquestionably one of the most common causes of indigestion.

~~2. Diseased Teeth.~~ Imperfect mastication is sometimes due to diseases of the teeth. Ulceration of the teeth is one of the most common ~~of~~ maladies among civilized people. ~~The teeth seem~~

* Transfer to p. 253

hyperpepsia, gastric catarrh,

Indeed, so prevalent has ^{of the teeth become, that} ~~to be falling into decay among civilized people.~~ It has been ^{factiously} suggested that the gold mines of the future will be found in the cemeteries of our great cities. The process of the decay of the teeth corresponds with ulceration in other parts of the body; it is due to germs acting upon the teeth. The germs feed upon the particles of food left between the teeth; hence the importance of keeping the teeth thoroughly cleansed. The teeth should be cleansed by thorough brushing ^{with} water before and after each meal. It is ^{as} important to cleanse the teeth before a meal ~~as well as~~ after, so that if there are any germs which have found their way into the mouth they ^{may} ~~need~~ not be carried into the stomach with the food.

Tartar left to accumulate upon the teeth causes ulcers of the gums, and loosens the teeth. Figs. ... and ... show the effect of tartar upon the teeth.

The use of the teeth in the mastication of hard, dry food, is one of the most ^{excellent} ~~important~~ measures for maintaining them in a sound condition. When soft food only is used, the teeth rapidly fall into decay. This is easily shown in the effects of distillery slops upon the teeth of cows, which is fully illustrated in Figs.

... and ...
~~Drinking at Meals.~~ ^{Liquids} ~~Drinking at meals encourages hasty eating, and unduly dilutes the digestive fluids in the stomach.~~ ^{not only} The use of cold fluids at meals has the effect to lower the tempera-

ture of the stomach and thus delay the process of digestion.

~~(For the balance of this chapter abstract matter prepared for new work on "Digestion.")~~

The desire to drink at and after meals is frequently due to the use of condiments, which, being irritating in their effects upon the mucous membrane of the stomach, give rise to unnatural thirst.

2. Too Frequent Eating. - The majority of mankind ~~have~~ ^{eat most twice} been accustomed to eating but once a day. This was also the custom of the ancient Greeks. ~~Many savages eat but once daily.~~ ^{eat} The practice of eating but twice a day prevails among the Chinese, ~~who~~ ^{eat} according to Dr. Pavy, ~~eat~~ ^{but twice a day} at 10 A.M. and 5 P.M. The same custom prevails in India. Among some of the savage tribes but one meal is taken daily. ~~Taking~~ ^T two meals a day is also the prevalent practice in France. It is only among the so-called higher classes of England and Germany that the custom of eating four or five daily meals prevails; and the bad effects of so frequent eating are apparent in these countries in the general prevalence of gout, rheumatism, and other disorders which grow out of over-feeding and disturb ~~the~~ digestion.

At least seven hours should be allotted for each meal; ^{ordinary} that is, the second meal should not ~~be~~ begun until ~~after~~ seven hours after the beginning of the previous meal. If a meal ~~has been~~ ^{is} taken before the preceding meal has been digested and passed from the stomach, fermentation results; the stomach ~~is~~ ^{and it continues to be thus} irritated, catarrh and

after the absorption of food in the stomach

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other disorders ensue, and the patient becomes, sooner or later, a confirmed dyspeptic.

Eating Between Meals.—The stomach requires rest as well as the brain or the muscles, *but* if food is eaten at other times than at meals, it is kept constantly at work. From three to six hours are required to digest most articles of food; hence, if food is taken again within five or six hours after eating, the stomach is kept in-

cessantly employed, and becomes exhausted. When the next meal is taken, it is unprepared to receive it, and indigestion with its myriad train of ills results.

~~The~~ habit of eating for the purpose of relieving so-called faintness or an "all-gone feeling", a sensation due to the ^{an over-irritated} condition of the stomach, while affording temporary relief, ultimately aggravates the difficulty. The faintness is due, not to the necessity for food, but to the irritated, exhausted condition of the stomach.

Eating between meals,

even though the articles taken ~~may~~ be nothing more than a little fruit, a bit of bread, a few nuts, or something similar, is always harmful, and is the frequent cause of dyspepsia. Even a small amount of food may be sufficient to keep the stomach active, and prevent its obtaining the needed rest and recuperation ^{to rest it} preparatory for the next meal.

Food remaining in the stomach affords opportunity for the development of microbes in great quantity, and, coincident with their development, there are formed poisonous substances which enter the ^{and indirectly} blood, irritate the nerves, destroy the appetite, ^{and produce Bright's Disease, Consumption,} and work general ~~mischief~~. The ill health of many young children is due to the habit of eating between meals, which is not infrequently encouraged by

paralysis, and other neuralgias,

parents from their earliest infancy. The child is given food to keep it quiet, a Practice which is most reprehensible from a moral as well as a physical standpoint. Children should be taught ~~to be regular at meals,~~ ^{that} as it is only by regularity ^{of eating} ~~in this respect~~ that sound digestion, regularity of the bowels and good appetite may be maintained.

When subsisting upon ordinary food, it is impossible to eat more than two meals daily and conform to the laws of good digestion.

The best hours for ^{these} ~~daily~~ meals are perhaps 3 A.M., and 3 P.M.

It should be added, however, that when the food taken is very small in quantity, or such as will be very quickly digested, as a baked apple, a little boiled rice, or some other light food, the food may be taken at shorter intervals, the length of time between the meals being determined by the quantity taken. In cases of disease it is often necessary to give the patient very small quantities of food at frequent intervals.

Time of Meals. - ~~the~~

The habit of eating late at night is extremely detrimental.

Digestion is carried forward only with great difficulty during sleep. The bad taste in the mouth, headache, the sensation of biliousness and general discomfort which follow a late supper, are evidence of the mischief occasioned by this practice. *At least four hours should elapse after the last meal, before retiring.*

5. Eating when Exhausted. - A thoroughly exhausted person

is tired throughout his whole body; not only the muscles, but also the nerves, the nerve-centers, the stomach, ^{the} heart, ^{in fact,} every organ, shares in the exhaustion. It is consequently clear that the ability to digest must be greatly impaired in a person who is ~~exhausted~~ ^{in this condition}. In

such cases, either no food at all should be taken until after a short interval of rest, ^{use what is eaten} or ~~the food taken~~ should be exceedingly simple and very light in character; ~~only the most digestible food should be taken in such instances~~ ^{such as} a little thin water gruel, or a cup of hot vegetable broth, or, still better, a few ounces of unfermented fruit juice, or a few raisins thoroughly masticated.

Violent exercise should never be taken ~~either~~ just before or just after eating. The same rule applies also to intense mental activity.



Cheerfulness at Meals.—The benefit derived from food ~~taken~~, depends very much upon

while the mind is

the condition of the body while eating. If taken in a moody, cross, or despairing condition, ~~of~~ ~~mind~~, digestion is slower and much less perfect than when ~~taken with~~ a cheerful disposition.

the person is in

* ~~OVER-EATING.~~ Over-eating results in dilatation of the stomach,

fermentation, and finally, serious injury, if not complete exhaus-

tion of the stomach. Many persons remain thin, notwithstanding a

prodigious appetite and the consumption of great quantities of

food, because of the exhaustive effort required to digest the ~~enormous~~ *large*

~~amount~~ *amount* quantities of food eaten and the imperfect character of the

digestive work done by the enfeebled and overtaxed stomach. Ex-

cessive eating is a frequent cause of biliousness.

~~A DAY'S RATIONS FOR A HEALTHY MAN~~ - The amount of food re-

How much to Eat.

quired to maintain vigorous health while leading an active life,
has been shown by Germaine See to be about 21 ounces, of which
2 1/3 ounces should be ~~herbivorous~~, ^{albuminous in some form} 2 of fatty, and the balance
starch and sugar. According to this authority, the amount of al-
buminous elements and fatty elements are about equal, the propor-
tion of ~~albuminous~~ ^{each} to the total being about one part to nine or
ten.

operations with
small
alterations

~~How much to eat~~
~~EXCESSIVE EATING~~ - - The system may accommodate itself to a

small excess of food much more readily than to a deficiency; never-
theless the excess is undesirable and damaging. An excess of fat,
starch, or sugar, may be temporarily stored up in the body in the
form of adipose tissue and glycogen, but the albuminous elements
cannot be thus ^{laid} stored up to any extent. Any excess beyond the
actual needs of the body must be treated by the kidneys and liver

21 1/2
2 1/3
2

12/15/6

precisely as an equal amount of excrementitious matter derived from the body itself.

* A good plan for persons who are inclined to eat to excess is to ^{dish up} ~~place upon the plate, or about it,~~ the entire meal before beginning to eat it, so that the quantity may be estimated with a reasonable degree of accuracy.

^{one cause of overeating}
The habit of eating too rapidly is a ~~very inveterate one,~~ and ^{one which is by} ~~it is by~~ no means always easy to overcome ~~it~~. The exclusive use of very dry food, or of a single simple article of food, is a successful means of getting control of the appetite.

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GLOBE

LINEN FABRIC

A test for the sufficiency of any given
dietary, is the ~~_____~~

manner in which it

body at its usual standard

mainten^{ance} of the strength and weight. If both weight and strength are diminished, the fact is an evidence that something is seriously wrong. If neither fever nor constitutional disease of any sort is present, it is probable that either the diet is insufficient or the digestion is seriously impaired.

The amount of food required (~~as shown elsewhere~~) is about (20 to 21 ounces) ^{should be} of water-free food; that is, the amount named should represent the weight of the food after subtracting the water which it naturally contains, and that which has been added in cooking. Ordinary bread contains about 40% its weight in water. A baked potato contains about two-thirds ^{of} its weight in water. Fruit contains only from one twentieth ~~to~~ one tenth its weight in actual nutriment. The amount of actual nutrient material contained in a given dietary can be readily estimated by reference to the Table of Nutritive Values given ^{elsewhere (p. ...)} ~~which also takes~~ ^{also taking} into account the amount ^{of water} added in cooking.

The amount of food required by an individual, ~~as already intimated~~, varies at different periods of life, according to the degree of vital activity. In infancy and childhood, when the vital activities are at their highest degree of intensity, ^{and} ~~when~~ growth and development ^{must} ~~are to~~ be maintained in addition to supporting the wastes of the system, the demand for food is greater in proportion to the size of the individual than at any subsequent time. In adult life, when waste and repair are about equally balanced, a sufficient amount ^{of nutriment} is needed to make good the daily loss from the various ment-

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al, physical and other vital activities, which can only be supported at the expense of tissue. Any larger quantity than this is an excess.

In old age, when the assimilative powers are weakened by declining years, the amount of food which can be assimilated by the individual is even somewhat less than what is really needed; hence, as age advances, the quantity of food should be gradually diminished. Very many old people break down much sooner than they would otherwise do, were they more careful in this regard. When they lay aside their vigorous, active life, they should also curtail the quantity of their food. By this act of temperance, they might preserve intact to a much later period, the integrity of their digestive organs, and so add years to their lives.

In not a few instances the foundations of dyspepsia ^{have been} laid by some mechanical injury, as a sprained ankle, a broken limb, or a severe bruise or cut, which required rest from active exercise for a few weeks. ^{taking into} Not ~~considering~~ the fact that much less food is demanded when a person is not engaged in active labor of any kind than at other times, the individual continues to eat heartily, and soon finds that his digestive organs refuse to do their work from sheer exhaustion. On this account, it should be made a uniform custom to eat lightly on the weekly rest-day. The hearty Sabbath dinners in which many people indulge, making the day an occasion of feasting rather than a rest-day, cannot be too much condemned. The custom is without doubt responsible for many other forms of Sabbath-breaking,

High
FASTING, -- Abstinence from food for a day, now and then, will
be found, ^{for} in many persons, an excellent means of regulating the
conditions of the system. There is no better means of relieving
an attack of biliousness than total abstinence from food for a
day, or even for a longer period.

This practice, however, must not be carried too far. ~~The~~
~~system can more readily dispose of an excess of food than compensate~~
~~for a deficiency.~~ A test for the sufficiency of a dietary, is the

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as no one can have clear perceptions of right and a quick sense of wrong, when laboring under the incubus of an overloaded stomach. For the hearty meal usually taken, it would be well to substitute a light one, consisting mostly of fruits and grains.

Handwritten scribble

DEFICIENCY OF IMPORTANT FOOD ELEMENTS.-- Food must not only be abundant and sufficient in quantity, but it must contain each of the several food elements, and in proper proportion. A lack of the carbonaceous element (starch and sugar or fat) will give rise to emaciation. A lack of the nitrogenous element will occasion ~~weakness of mind and body~~ ^{indigestion and} an impoverished state of the blood, ^{with} ~~and indigestion~~ ^{resulting weakness of body and mind.}

Women who undertake to live upon tea and coffee with a little white bread are existing in a state of partial starvation. The use of superfine white flour from which the gluten or blood-making element of the grain is largely excluded, has been the cause of ~~the~~ ^{in a great number of cases.} sickness and disability of ~~millions~~. An eminent French physiologist found that a dog fed upon such bread died of starvation in a month, while another dog, fed upon Graham bread for the same time, remained alive and in good health. ~~Our large medical work~~ ^{shows} ~~the respective amounts of different articles required to furnish~~ ^{ing the following table,} ~~the necessary quantity of nitrogenous matter for one day's rations.~~

ing the following table,
P. 373
H. 1573

(Here follows Table.)

* Home Hand Book of Domestic Hygiene and Rational Medicine, Modern Medicine Publishing Co., Battle Creek, Mich., U.S.A.

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Food Combinations.— Careful experiments have shown very clearly that different classes of food require a particular quality of digestive juices for their digestion. For instance, a gastric juice that will digest animal food the best, is inferior for the digestion of vegetable food, and vice versa. The obvious conclusion to be drawn from this fact is that the simpler the dietary, the more perfectly will the digestive process be performed. For persons whose digestion is naturally weak this is a matter of especial importance. The following table represents the best and worst food combinations :—

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GOOD COMBINATIONS.

- | | |
|---------------------------|------------------------|
| Grains and Fruits. | Grains and Milk. |
| Grains and Meat, or Eggs. | Grains and Vegetables. |

FAIR COMBINATIONS.

- | | |
|---------------------------------|----------------------|
| Grains, Sweet Fruits, and Milk. | Meat and Vegetables. |
|---------------------------------|----------------------|

BAD COMBINATIONS.

- | | |
|------------------------|----------------------|
| Fruits and Vegetables. | Milk and Vegetables. |
| Milk and Meat. | |

Those foods agree best whose chief constituent elements are digested by the same fluid, in the same part

of the alimentary canal, and in about the same length of time. Vegetables contain a great amount of coarse, woody structures, which are retained in the stomach a long time before they are sufficiently broken up to be easily digested in the intestines. Fruits, on the other hand, remain but a short time in the stomach. The large amount of saccharine matter which fruits contain, makes them likely to set up fermentation in the stomach, if retained too long. Acid fruits are also likely to delay starch digestion. This is another reason for their interference with vegetables, the starch of which is rather more difficult of digestion than that of grains.

Milk and vegetables are likely to disagree, for the reason that milk, when taken by itself, is retained in the stomach but a short time, its digestion being carried on chiefly in the small intestine. Milk and meat are a bad combination for the same reason. Meat requires long digestion in the stomach, whereas milk, when taken by itself, is quickly passed on, to be digested by the pancreatic juice. When taken with meat or vegetables, milk, being long retained in the stomach, undergoes fermentation, resulting in sour stomach, biliousness, and various other unpleasant symptoms.

If the bill of fare taken at a single meal were confined to three or four articles of food, there would be fewer dyspeptics scanning the newspapers for some patent nostrum to "aid digestion."